VICTOR G. PANOV

EMOTIONS MYTHS AND THEORIES

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Athenian jar, c. 550 BC, from Italy.

Theseus attacks the Minotaur, represented as usual on Greek vases as human but with the head, neck and tail of a bull.

The present volume analyses the origin and evolution of logical thought and the transformation of sensory reflection caused by it. It investigates the transmission of social and historical experience from generation to generation as measures of understanding and practical application of objective laws.

VICTOR G. PANOV

EMOTIONS MYTHS AND THEORIES

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Foreword

The problems to which this book is devoted can hardly be called new. Some of them had already been posed in antiquity. In spite of the fact that the attempts to solve them have given rise to a voluminous literature, one can say that the results achieved have not given a satisfactory answer to several of them, which have remained topical to the present day. These are the problems that arise when we study human consciousness and reason, and when we elucidate the patterns of man's understanding of the external world and of himself, and of his place in the world. Not only has interest in these problems not diminished in recent times but there has been a tendency, on the contrary, for it to mount, evoking lively discussion among both philosophers concerned with the theory of knowledge and other scientists (psychologists, sociologists, educationalists, logicians, mathematicians, ethologists, and specialists engaged in heuristics, cybernetics, etc.).

Among the problems arising when processes of consciousness and understanding are investigated those that lead to paradoxical situations deserve special attention, viz., to the impossibility of overcoming logical contradictions that stem (it would seem) from the simplest, most obvious premises. These problems include the link between sensations and human reason, and the relation between the sensual and rational aspects of understanding. Philosophers from the time of Plato have been investigating the difference between the mentally comprehended (noumenon) and what is comprehended by sensations (phenomenon), a difference

they reduce to opposition. Classical philosophy drew a more or less clear line between sensations (emotions, feelings, notions, etc.) and reason (judgments, abstractions, ideas, etc.). But difficulties arose when explaining the connection between these two aspects of cognitive activity which led to the formation of rival conceptions that found expression in a centuries-long confrontation of sensationalism and rationalism. Discussion developed, in particular, on the source of the knowledge that every individual person and humankind as a whole disposed of. By the source of knowledge, moreover, was understood men's cognitive capabilities that enabled them to obtain knowledge about the external world and themselves. On the one hand, it seemed natural that our knowledge of anything could not emerge in our head unless we had the power to sensually perceive a phenomenon about which we knew something. How can it be claimed that we really know something if we have never seen this 'something' anywhere? have heard nothing about it? have not perceived it? have not experienced grief or joy from it, and so on? On the other hand, however, there is also the undoubted fact that our mind has facts about sensually unperceived objects. People have mentally employed fantastic images of centaurs, goblins, local and universal gods, etc., from time immemorial. Works of literature and art would be impossible without invented characters. Idealised objects that do not exist in reality, and therefore cannot be sensually perceived as independent of our consciousness, were widely employed in science (for example in mathematics) long before the scientific and industrial revolution. Nevertheless, where do the facts about unperceived objects come into our consciousness from, if the source of our knowledge is sense data?

In pre-Marxian philosophical literature one of the last attempts to overcome the 'tragic dualism' of the sensory and the rational that received world recognition was Immanuel Kant's. Kant's proposed the synthesis of the sensory and rational within the context of a philosophical conception led to a counterposing of the postulates that resulted in an inner dualism of the conception itself, a dualism that it was as difficult to overcome as the incompatibility of sensationalist and rationalist philosophical conceptions.

With the development of the separate sciences, and in particular with the growth of scientific knowledge, the old epistemological problematic underwent changes, as did also

investigation of the sensory/rational relation. In the middle of the last century analysis of *scientific* knowledge had already emerged from the general theory of knowledge and acquired independent philosophical significance. The philosophy of science, arising as a special branch of research, made it its special aim to study the structure of scientific knowledge, the means and methods of scientific understanding, and the laws of development of science. At the same time the relationship of the empirical and theoretical levels of science also emerged in the theory of knowledge and was subjected to special examination. The sensory/rational link, interest in which had been characteristic of the general theory of knowledge, is yielding place in the philosophy of science to the empirical/theoretical relations, which is more and more often becoming the subject of special studies devoted to the analysis of scientific knowledge.

There are definite historical and logical grounds for singling out of the problematic of the relations of the empirical and the theoretical as an independent field of study. In fact, the connections of the sensory with the rational and of the empirical with the theoretical are not identical. When we trace the difference between them we must point out first that sensory reflection of reality is inherent in animals that do not possess reason, while empirical knowledge, being a stage of scientific knowledge, posits the existence in the knowing subject of a capacity for rational, reasoned reflection, i.e. the existence of consciousness.

The concepts 'rational' and 'theoretical' are also not equivalent. In the natural sciences rational knowledge arose and developed together with the rise and development of the thinking being, i.e. in the course of the transition from the animal's direct sensory reflection of reality to its ideal reflection in the heads of primitive men. In other words, the beginning of rational knowledge coincides in time with the evolution of the first representatives of *Homo sapiens*. But although primitive thought reflected the world at the rational level as well as the sensory, it was still neither theoretical nor scientific. Before man acquired the capacity to construct theoretical models of things, and of their properties and relations, and to create a scientific picture of the world, he passed through a long period of mythological consciousness in his historical development. Early forms of mythological perception of the world have been preserved to our day among tribes that have lagged behind the development of

other peoples for a number of reasons. These tribes' membership of the human race, and the attitude of peoples who are at higher levels of social development toward them as rational beings are practical questions of modern times with a deep moral content as well as a scientific and theoretical one.

The fact that man, who is distinguished from beasts by being a rational being, does not always or everywhere think in scientific categories, or is guided by a scientific world outlook in his life, not only has epistemological causes but also social ones.

But it would be a mistake, when tracing the difference between sensory-rational relations on the one hand, and empirical-theoretical ones on the other, not to see that they have a certain, inherent, common element. That is because rational knowledge grows genetically from sensory, while the sensory-rational relation is a precondition of the subsequent rise of the empirical-theoretical one. We can therefore assume that the difficulties that arise in analysis of the empirical and theoretical levels of scientific knowledge have their roots in the long-known epistemological sensory-rational problematic. And the fact that these difficulties really exist is shown by the internecine struggle of the various modern Western trends in philosophy concerned with investigation of scientific knowledge.

Positivist attempts to substantiate the reliability of scientific knowledge through a rejection of the 'phantoms' denying sense perception, and at the same time by banishing exclusively philosophical questions as 'metaphysical' ones lying outside the sphere of science, have not been successful.

The crisis of the latest conceptions of neopositivism has increased the discrepant and otherwise discordant chorus of the advocates of methodological pluralism. Voices are beginning to be distinguishable in this polyphonic chorus that reflect a leaning toward the old epistemological problematic and to a new reading of the texts of thinkers of the past.

A striving to rethink the philosophical heritage of the past is attractive now in fact, because many of the riddles of the present and future lie in the depths of the past. In order to disclose the essence of some phenomenon as fully as possible, and to predict how it will be in the future, it is important to understand how it arose and developed and became what it is here and now. That also applies to the

enigmas that modern theories of scientific knowledge are trying to find the answers to. We can therefore consider it justified to return to the old philosophical problematic of the relation of sensation and reason so that we can see, through the prism of the difficulties met in the past, those that have arisen in the analysis of the relations between the empirical and the theoretical in modern theories of scientific knowledge.

But, however attractive excursions into the history of the development of knowledge of consciousness and understanding may be, this history itself can be scientifically explained from the standpoint of dialectical materialism as a subjective reflection of *objective* processes taking place in nature and society. Discovery of the mutations of consciousness not only does not eliminate the task of disclosing their objective patterns but makes it even more urgent.

If there were no content in consciousness that did not depend on the consciousness of each individual, or of all men taken together, there would be no hope of establishing universal values. Their place would be occupied by the unpredictable will of *subjective* decisions on whoever's behalf they spring, whether of separate individuals, states, peoples, nations, gods, or of all the people now living on our planet. Such an alternative is fraught with danger for human existence itself. In fact the fighters for truth who do not recognise the existence of objective truth in some way attribute the status of universal truth to their own subjective convictions. What seems just to individuals is raised to the rank of universal, extra-historical justice or correctness.

The principle of the historicity and objectivity of truth in relation to the problems arising during study of the transition from sensory knowledge to rational, from the empirical to the theoretical, means that an *objective* determinant has to be found that will preordain this transition. In order to discover the objective conditionality of this transition it is useful to review the evolution of knowledge not as a psychological act stemming from an individual, already formed, knowing personality, but in the broad scientific aspect as a transition from sensory reflection of reality by man's animal ancestors to its rational reflection by humans. This means that we must make attempts to mentally reconstruct the mechanism of the origin and development of consciousness and knowledge from the appearance of the first glimmers of thought among the ape-like predecessors of man to

humans' capacity to create modern theories enabling them to penetrate the secrets of both the macrocosm and the microcosm.

An attempt at such a reconstruction is made in this volume in its most general, schematic form. It is a revised version of our monograph *The Sensory, Rational, and Experience* published in Russian by the Moscow University Press in 1976.

In conclusion we would like to thank the staff of the philosophy department of Progress Publishers for suggesting that this book be published in English and Swedish, and to the translators who have spent their time on it. It remains for the author simply to hope that his book will prove useful to readers interested in the old, but at the same time topical, problematic of the genesis and evolution of consciousness and knowledge.

1

A Contribution to the History of an Old Dilemma

In a process as complicated as cognitive activity there is a host of premisses, preconditions, transitions, conditions, and other moments that play a role of sorts in achieving the results of knowledge. Some of them are obligatory (in the sense that their absence makes the very process of knowledge impossible); others have a more or less chance character. To avoid differences in the interpretation of terms signifying one moment of the process of knowledge or another, we shall touch on some definitions related to our theme so as to reduce the risk of a different understanding of the text as far as possible.

The obligatory premises include the existence of a *subject* of knowledge, i.e. of someone who performs cognitive activity, and the existence of an *object* of knowledge, i.e. of something to which the subject's activity is directed. Sometimes the subject-matter of knowledge is singled out from the object of knowledge, i.e. the aspect (property, relation) of the object that is included in the given cognitive process from a definite standpoint, according to the aims and interests of the knowing subject. Man as an integrated object of knowledge, for example, figures in various qualities as the subject-matter of knowledge in sociology, physiology, psychology, ethics, etc. The subject-matter of knowledge can be either objects of the environment counterposed to the subject in the form of the world around him, or the subject of knowledge himself, as happens in self-knowledge. It is necessary to remember, too, that the term 'subject-matter' (cobject') is used not only in the sense of 'subject-matter of

knowledge' but also to mean a part of the objective world with a relatively independent existence, i.e. with a meaning identical or close to the concept *thing*. The sense of the term can be established from the context in which it occurs.

By cognitive activity we understand primarily the process through which the peculiarities of the object of knowledge are *reflected* in the consciousness of the subject with some degree of reliability. The result is the aggregate or totality of the knowledge or information, in short the data the subject has about the object of knowledge. The subject's experience of his relations with the external world and himself in the form either of satisfaction or of dissatisfaction constitutes the sphere of *emotions* (positive or negative).

Apart from the subject-object relation, the necessary conditions of the cognitive process include the existence of channels in the subject by which he receives information about the object of knowledge, and also the existence of a capacity in the subject to retain and process this information according to certain rules.

The moments listed above do not exhaust all the premises and conditions that make cognitive activity possible but we can limit ourselves to them at the beginning of our exposition since their existence is sufficient for a review of the initial premises that have led since antiquity, it would seem, to unresolvable contradictions in explanation of the nature of knowledge. Several of these contradictions were linked with the difference between, and opposition of, the two aspects (degrees) of knowledge, viz., sensory and rational. In order to designate these two aspects, moreover, various writers use different terms. The sensory aspect, for instance, is sometimes called sense experience (or simply experience), sensibility, sensibilia, etc. The rational aspect is called abstract, logical, rational, or conceptual thinking, intellect, etc.[1]

In spite of the host of terms (which in itself is indirect evidence of the complexity and many-sidedness of these two aspects of cognitive activity and their relations) a quite definite line can' be drawn between them, for all that, which indicates their qualitative difference.

Sensory knowledge most often includes sensations, perceptions, and representations (notions).

By *sensations* we understand the elementary psychic phenomena that arise through the direct effect of objects on

the subject's sense organs and are experienced by the latter as qualities inherent in the objects themselves (yellow, round, sour, etc.).

Sensations underlie *perceptions*, i.e. the direct sensory reflection of reality in the form of *integral* (whole) sensory images. The object of knowledge figures in the perception of objects as a unity of its various aspects and properties, as something independent (e.g. a lemon as a unity of sensations of yellow, roundness, etc.).

Finally, a *representation* (notion) is a sensory-visual image that is preserved and reproduced by the subject without direct action of the object on his sense organs (we can represent or imagine a lemon from past perceptions without having to observe the fruit here and now).

By the main forms of *rational* knowledge are traditionally meant concepts, judgments, and inferences or deductions. Hence, while not claiming to give an exhaustive definition of these forms, we refer only to some of their features that can be certain initial moments in an attempt to disclose the content of rational knowledge more fully during our exposition.

From the many definitions of *concept* we single out the one in which a concept is considered a thought reflecting the material properties, connections, and relations of objects in *generalised form.* It is a form of ideal reflection of reality that is linked with the use of language. When an ancient sage, walking in a shady grove with his disciples, turned to them with the words 'Does a tree exist? If so, show it to me', he certainly already knew that they could point to a lemon tree, an oak, a chestnut, or a cypress, but not to a tree in general. 'Tree' exists as a concept in our consciousness; it is designated in language by a word—of that there is really no doubt—but what does it correspond to in actual reality? As the age-long discussions between, in particular, holders of the conceptions of nominalism and realism have shown, it is not really a simple matter to answer this simple question.

As for *judgments* as forms of rational knowledge, ideas are usually meant by them that are expressed in the form of propositions in which something about the properties, connections, or relations of objects are affirmed (or denied), the thought being either true or false.

And finally, by *deductions* or *inferences* we have in mind a mental operation (reasoning) during which a new judgment

(called a consequence or conclusion) is drawn from one or more judgments (premises).

From what we have said it can be concluded that both sense, or immediate, and rational knowledge are considered to possess a multi-level structure. As for the difference between them, the commonest view among the many philosophical schools and trends is the claim that it consists, basically, in the following.

Sense knowledge operates with visual images that arise as the result of direct or immediate observation. It is ultimately some sort of aggregate of sense data, or sensations (sensibilia). Sensibilia have a unique, concrete character depending on both the peculiarities of the concretely observed object and those of the structure of the observing subject's sensory apparatus.

Rational knowledge, on the contrary, operates with concepts (universals) that have a general character. Operation with concepts follows definite rules that do not depend on the will of any single individual (individuum). It is mediated by a system of signs (language).

Many philosophers (especially those taking a materialist stand) add to this that sense knowledge reflects the external aspect of things, is concerned with the world of phenomena, while rational knowledge penetrates the essence of things and grasps the inner necessary connections of objects.

According to which proposition about the qualitative difference between the sensory and the rational is recognised in philosophy, the attitude to the place and role of these aspects in the process of knowledge has led to a division of gnosiological conceptions about this point into two main currents. One (the empiricists and sensationalists) considers sense experience the main form of knowledge, the other (rationalists), abstract thinking, reason. Features of both these trends are illuminated in the works of many authors in the Soviet Union and other countries. In treating certain problems of the historical confrontation between spokesmen of sensationalism and rationalism in this chapter we have not set ourselves the task of giving an exhaustive description of the many philosophical conceptions that incline toward one or other of them or that try to overcome the one-sidedness of each of them. For our purposes it is important to consider the historical, philosophical opposition of sensationalism and rationalism through the prism of a deliberate exposure of the essence of the disagreement between them,

and of stressed counterposing of their main initial propositions, so as to demonstrate with the maximum clarity that the problems of overcoming the incompatibility of the postulates of sensationalism and rationalism, in the form in which they have been and are posed by spokesmen of non-Marxian philosophical theories, could not and cannot find a satisfactory solution in them.

In order to avoid unjustified simplifications we need to note quite clearly that it is difficult to name an empiricist or a sensationalist among the classical spokesmen of both sensationalism and rationalism who fully excludes the role of reason from the process of knowledge, and equally a rationalist who has not adduced some significance to sense knowledge. Nevertheless the main initial propositions of sensationalism and rationalism differ so from one another that attempts at a consistent development of one of them, it would seem, have led to results diametrically opposite to the conclusions that followed from another premise. But the eclectic mixing of the premisses of sensationalism and rationalism within one theory has led to the creation of conceptions suffering from inner inconsistency and incapable of overcoming the difficulties that stem from the real difference between the sensory and rational aspects of knowledge.

The many attempts to reduce the phenomenon of the consciousness knowing and possessing knowledge to an aggregate of sense data are linked with the classical sensationalist formula: 'There is nothing in the intellect that was not previously in the senses'. The legitimacy of these attempts has a fundamental basis, it would seem, in the fact that we have no other source of initial information about the world other than the data of sense experience, a fact that is also recognised by the dialectical materialist theory of knowledge. 'The first premise of the theory of knowledge,' Lenin wrote, 'undoubtedly is that the sole source of our knowledge is sensation.'[2] 'Save through sensations,' he said further, 'we can know nothing either of the forms of matter or of the forms of motion.'[3]

Many attempts have been made in accordance with the initial formula of sensationalism to explain the transition from the isolated data of sense experience to general concepts by their mechanical uniting and transformation. They failed, though they had a positive significance in their day. The thesis of the formation of concepts from an aggregate of sense-perceived data, taken into the arsenal of metaphysical

materialism, in particular, played a positive role in the fight against idealist speculations about the supernatural origin of rational knowledge. The origin of conceptual thinking was not due to the intervention of a supernatural force but came from the development of sense knowledge itself.

Spokesmen of sensationalism who took a materialist position started from notions that the sensory image was an ideal 'copy' of objects existing outside consciousness. But the limitation inherent in the metaphysical method did not allow of a satisfactory solution of the problem of the relationship of sensation and reason.[4] In particular, a satisfactory answer was not obtained to the question of the character of the transition of the quantitative accumulation of the isolated data of sense experience into a new quality of commonness proper to conceptual thinking. The assumption that the elementary sensation already contained the general within itself, but only in an embryonal, undeveloped state, led to conceptions of a sort of gnosiological prefigurism that wiped out the qualitative boundary between sensation and reason. The striving to shake off prefiguristic extremes led to new, unresolvable dilemmas.

The mechanism of the rise of general concepts from an aggregate of sense data appears as a process of the discovery of constant, invariant characteristics manifested during the manifold superimposing of various projections of the sense image on one another. After many repetitions of the projecting of objects in the memory, everything chance and secondary is discarded and the most frequently repeated and permanent is ultimately traced out and identified with the universal. A general concept is thus formed, derived as it were from the background of individual sense perceptions rather like, for example, the technique by which periodically repeated weak signals are sorted out distinctly from background noise in a radio receiver. The idea of the birth of general concepts through discovery of repeated moments in the connections (associations) of various psychic phenomena, which follows from the main postulate of sensationalism, was developed further by associative psychologists.

The weakness of the argumentation of the supporters of this method of extracting the general from the particular was not so much that the general was identified with the most frequently repeated as that there was repetition in fact where there was a general pattern and necessity. But repetition of the results of observations still cannot serve,

in itself, as evidence of the truth of concepts, judgments, or deductions based on it, if we are thinking of the frequency of the pattern of events perceived directly by the sense organs. It does not follow, for example, because Europeans have seen only white swans millions of times, that the statement 'all swans are white' is true, excluding the possibility of even just one non-white swan being discovered in objective reality.

If the repetition of results deduced from immediate sense data were in fact sufficient grounds for forming concepts more or less adequately reflecting the objective sources of the phenomenon's repetition, we would have to acknowledge the existence in many species of a capacity for conceptual thought. Their analysers also fix the similarity of perceived situations in which they find themselves many times by virtue of a mode of life linked with the specific environment of their habitat. The deduction of a general concept from a consecutive series of direct observations could at best be considered attainable only if the series were admitted to be fully completed. But it is impossible, indeed to consider a consecutive series of observations to be completed once and for all. For it already follows from the very premiss of the possibility of a repetition of the observations that they may be repeated any number of times, and that there will be a new number '$n + 1$', etc., to infinity, for any finite number of observations. What is said above relates to observations not only of the properties of objects but also to the relations between various phenomena following on one another in space and time, and to the establishment of links between them.

If a visible flash of lightning, for example, is accompanied 1000 times by audible thunder, it is still impossible to conclude that, with the same state of our vision and hearing, we shall necessarily hear peals of thunder the thousandth and one time after a visible flash of lightning. It could be that, unlike the preceding thousand-times repetition of this event, the last of the observed rumbles of thunder was so weak or so far away from the observer that, in spite of his seeing the gleam of lightning, he could not hear the accompanying sound because of the weakness of the signal, which was below the 'resolving' power of his aural analysers.

It may be objected that sound waves that are not perceived directly by people become accessible to perception through the use of 'mediators', e.g. instruments that transform weak

signals into stronger ones. But this, surely, is a matter precisely of the trend of sensationalism that tried to deduce general concepts from an aggregate of immediate sense data, passing over any third, mediating link. The introduction of instruments as a mediating link between subject and object gives rise to a number of new problems also requiring solution. But as a rule they remain apart from sensationalist conceptions that claim to deduce general concepts from an aggregate of immediate, direct data of sense experience.

The repetition of a sensually perceived succession of events cannot serve as a reliable basis either for the formation of judgments about an inner, causally conditioned connection between them along the lines of 'every appearance of event *A* necessarily entails the appearance of event *B*'. If we could not go beyond the bounds of direct sense fixation of events, repeated following of events on one another would, at best, serve as grounds for a *post hoc* statement, but not a *propter hoc* one.

In that case we would have to express doubt, following David Hume, in the objective existence of causality, assuming that perception of a regular following of event *B* on event *A* leads to a mistaken conviction that grows into a stable association of expectation, to habit, and finally to a faith that every appearance of event *A* in the future will entail the appearance of event *B*.

The interpretation of the main postulate of sensationalism, namely that there is nothing in the intellect that was not previously in the senses, proved so hopeless that it was proposed, as a way out of the impasse in general, to 'remove' the question of the objective content of general concepts, and to eliminate it from scientific currency as wrongly formulated. Absolutising of the sensory aspect was one of the gnosiological roots of subjective idealism, including its neopositivist trends. All actual reality was reduced somehow to an aggregate of direct sense data, to a 'set of sensations' without any underlying objective basis. General concepts or categories were declared fictions without cognitive significance since they could not be verified by direct experimental data. The problems of whether they reflected any essential aspects of objective reality were classed, like statements about the essence of objective reality itself, as 'pseudo-questions' that are allegedly outside the data of experience, are metaphysical, and should not interest positive science. Some of the latest holders of such a point of view were the

logical positivists, who sought a way out of the dramatic situation by developing a probability logic. Rudolf Carnap, characterising the difference between scientific knowledge and the data of direct observation, remarked that the former was formulated in terms of logical thought, while the latter represented an incomplete series and could only provide information of a probable character which was displayed in the relative frequency of the observed events. According to him, probability logic is an inductive logic based on the degree of confirmation of statements. To some extent this logic resembles deductive logic, which is the limiting case of inductive logic. Both are a system of purely *a priori* relations, according to Carnap, independent of the facts and of the truth or falsity of the premises leading to them. Deductive logic, moreover, in spite of its limited nature, gives definitive, complete results, while probability logic gives only different degrees of confirmation. Probability inductive logic is an extension of deductive logic through the addition of a certain new function of confirmation.[5]

The idea that the age-old dispute between rationalism and sensationalism was to be resolved by probability logic in favour of the latter received clear expression in the work of Hans Reichenbach, an influential member of the Berlin group of logical positivists. He subjected Kant to sharp criticism for having, in his view, only succeeded, while claiming to unite sensationalism and rationalism into a single whole, in 'cluttering up' the concept of experience with rational moments; the sensationalists, to their misfortune, accepted the rationalists' postulate of the possibility of complete proof, by virtue of which consistent sensationalism led in the person of Hume to inevitable scepticism. As Reichenbach considers, the new achievements of the natural sciences (non-Euclidean geometry, the theory of organic evolution, the theory of relativity, quantum mechanics) are freeing thought from the bonds of rationalism and leading to a conclusion about the unacceptability of the rigid determinism that rationalism had long been trying to drag into science.

The development of logistic logic, Reichenbach claims, has shown that the whole apparatus of logic and mathematics that rationalism tried to impose on reality consists of tautologies and lacks factual content. It is necessary to see the way out in the fact that 'the problem of probability ... contains the nucleus of every theory of knowledge'.[6] As one of

the critics of this conception has noted, growth of our knowledge means that we are passing to theories with decreasing probability rather than increasing (in the sense of a calculus of probability), so that high probability does not coincide with the goal of progress of knowledge.[7]

In fact, the less probable the events predicted by a theory are, the more pithy it is. It is enough to compare two theories, one of which predicted that the average air temperature in Moscow in two years' time would be —2°C, and the other that the temperature in Moscow would be —35°C on 12 January in two years' time.

In the dialectical materialist theory of knowledge, it should be noted, probability relations are given great importance, for they are treated as manifestations of the inner natural connections of phenomena (e.g. in the form of statistical regularities). When scholars who hold to dialectical materialism are working on problems of probability logic, they employ the valuable results that have been obtained by individual logical positivists in concrete fields of logical studies proper. But as for the philosophical interpretation of these results, logical positivism cannot overcome the narrow limits of empirical subjectivism. Since problems of probability are admitted to be the 'nucleus' of the theory of knowledge, and the relative frequency of observed events and degree of confirmation of statements are made the basis for establishing probability connections, the results of knowledge can only be reduced to the discovery of the outward succession of the events in time and space. The human mind proves doomed to skate about on the surface of events. But questions of whether it can reflect the general pattern of the development of the objects of knowledge, penetrate to the inner essence of things, and 'grasp' the causal connections of phenomena, are declared to be 'pseudo-problems' of no scientific value. That point of view has led to a tendency to reject determinism, deny objective truth, and pass from relativism to agnosticism.

The weakness of the positions of orthodox sensationalism had already been guessed by eighteenth century rationalists. Unlike the sensationalists they defended the proposition that the general character of concepts could not be deduced from an adding together of sense data. The intellect disposed of an additional faculty, apart from the concatenation of 'sensa', that enabled the mind to extract reliable knowledge of a universal and necessary character from

observed reality. But where did this 'addition' come from that gave reason a new quality in principle compared with feeling, if this quality did not exist in the sense data themselves? The rationalists counterposed their inherent faith in the omnipotence of reason not only to a narrow sensationalism but also to religious dogmas that declared the intervention of a supernatural creative force not amenable to rational explanation to be the source of man's capacity for logical thought. The rationalists made no small contribution in the history of philosophy to the fight against various forms of irrationalism and religious mysticism.

Having called in question the postulate of the direct intervention of the will of a divine creator in the cognitive process (which it was far from safe to do when a religious outlook predominated) and not being able to discover the basis in actual reality itself that would make it possible to unite the sensory and rational degrees of knowledge logically and equivalently, the rationalists could not, apparently come to any other conclusion than to explain the capacity for logical thought by an inherent capacity of the human mind itself that found expression in intellectual intuition. Just as the eyes see form, colour, etc., the mind, by-passing the data of sense organs, directly 'grasps' universal and necessary connections expressed in the logic of concepts. If sense experience also has a place in the mind's direct judging of universal truths, it is simply as a kind of catalyst promoting manifestation of the logical schemes that are being examined by 'the eyes of reason'. This rupture between sensibility and rationality led to an antinomy of conceptions, and the origin of consciousness remained an open question. If a capacity for logical thought is given to man by nature, then why has nature endowed only man with this quality, and refused it to other members of the animate world?

Absolutisation of the rational aspect of knowledge was reflected as well in various forms of objective idealism, which 'found' a way out of the difficulties by declaring that general concepts or universals underlay the universe. The problem of the origin of consciousness did not essentially arise here, because it was posited as an axiom that there was initially a consciousness in general, an Absolute Idea, a Cosmic Reason, etc.

It is not out of place here to recall Hegel's approach to this matter. From the general proposition he put forward,

expressed in the triad 'the Absolute Idea—Nature—Spirit or Absolute Reality',[8] it followed that consciousness in general, Consciousness with a capital *C* (Absolute Idea), was 'materialised' in Nature and by-passing through Nature was again 'dematerialised' in human consciousness. In *The Phenomenology of Mind* Hegel treated the genesis of human consciousness as the process of its becoming and development from elementary forms of sensation to the highest levels of theoretical thought. The problem of the antinomy of sensory knowledge and the logically highest level of knowledge was removed, as is generally characteristic of the conceptions of objective idealism, but in Hegel it was removed dialectically. The sensual was treated as the cause of the awakening of the mental or spiritual as a level of development of consciousness in general that contained not only isolated, concrete data in itself, but also something general that was already manifested at the level of perceptive consciousness in the form of as yet very 'meagre' abstractions. Because of his dialectical approach Hegel succeeded in 'grasping', though in an idealist form, certain essential aspects of man's objectified activity, and in coming close to an explanation of his history as the result of his own labour.

In starting from the mediated character of human activity, Hegel made a number of profound remarks about the qualitative difference between man's thinking and the psychic activity of animals. He put forward, in particular, an important thesis about the 'cunning' of reason to pit the forces of nature against one another to realise set aims. Reason is as cunning as it is powerful.

> Cunning may be said to lie in the intermediative action which while it permits the objects to follow their own bent and act upon one another, till they waste away, and does not itself directly interfere in the process, is nevertheless only working out the execution of its own aims.[9]

But the premises of objective idealism could not lead to solution of the problem of the relation of the sensory and the rational. Since Nature was declared the 'other' of the Absolute Idea, the principle of the identity of thought and being underlying Hegelian philosophy was essentially reduced to that of the identity of thought with itself, while the historical process of the origin and development of various levels of knowledge was interpreted as one of self-knowledge of the Absolute Idea by itself. Thus, in contrast to materialists, who considered sense images to be 'copies' of real ob-

jects, the adherents of objective idealism declared objective reality itself to be the creation of some universal reason which was also contained from the very outset in sensation.

That point of view was held by one of the last eminent advocates of rationalist idealism, Brand Blanshard, who tried (in the spirit of Hegel, but without Hegel's dialectic) to substantiate the thesis that the object is nothing other than the fully realised idea. According to him, sensation already contained some repeated or universal element in itself, in its sources. If universals had not been present in experience from the outset they could not have appeared at more developed stages of the cognitive process; therefore there were already general concepts in the perceptions of animals. Without universals there could be no identification.

> For if we are really confined to transient particulars, then every judgement of recognition, every identification of anything, and in the last resort every perception, is a snare and a delusion.[10]

Being far from a dialectical materialist understanding of the origin of consciousness, Blanshard did not see the profound qualitative differences between the mechanisms of identification in the psyche of animals and the consciousness of men.

The thesis about intellectual intuition advanced by early rationalists was developed in philosophical conceptions that found their logical completion in conclusions directly opposed to their intentions of confirming the power of reason. The founder of the phenomenological school, Edmund Husserl, and his disciples, for instance, starting from recognition of the impossibility of synthesising rational thought with sensory experience, tried to build a 'pure' logic of scientific knowledge by banishing sense data completely from the sphere of consciousness. Excessive concentration on the mind's capacity for direct judgment of truth, typical of the early rationalists, led to conceptions of intuitionism and the associated attempts to bring subconscious factors to the fore in the cognitive process. One of the most famous representatives of the intuitionist interpretation of knowledge, Henri Bergson, considered man to be capable, thanks to intuition, of learning the secrets of being without any mediating link, even forms of the logical level of knowledge (reasoning, abstraction, generalisation). In his view mind directly contemplated mind in intuition without any intermediaries. In intuition there was an indivisible, and therefore substantial-

ly continuous, flow of inner life. This contemplation, which can hardly be distinguished from the contemplated object of knowledge, is contiguous and almost coincident.

One of the epistemological roots of idealism is the singling out and excessive inflation of some one aspect of the universal connection of phenomena. Materialists sharply criticise the adherents of intuitivism, but not because they, for their part, deny the existence of moments of intuition in the process of knowledge. The idealism of the intuitivists does not stem from the fact that they recognise the role of intuition, but from their absolutising of it, their effort to represent it in itself as the sole means of understanding truth. The essence of intuition is reduced, moreover, to a mystic capacity of the subject that is not rationally explicable, while the objective bases of its origin remain outside their ken.

The existence of intuitive moments in thought was noted long ago in the past. The very fact of the protracted dispute between sensationalists and rationalists, and the difficulties associated with its resolution, witnessed to the qualitative difference between feeling and reason, surmised to some extent intuitively, and not capable of easy exposition in scientific terms. As Gustav Bergmann remarked (he was a member of the Vienna Circle at the beginning of his career), all sensible statements must be either analytical or empirical and synthetic. Truths that are related to facts cannot be outside experience (unexperienced) but analytical statements belong to the unexperienced. And though they are tautological, i.e. empty (in the sense of the existence of substance or content), there really is a difference between them and empirical statements. According to Bergmann, this difference, is grasped intuitively, and is not created or dreamed up by philosophers.[11]

The failure of attempts at deducing rational thought directly from the aggregate of sense data led to the idea of a third link of some sort that would play the role of an intermediary in the transition from the sensory to the rational through a three-member formula 'sensation—x—reason'. It was also remarked that discovery of this unknown middle link would be an important milestone in the history of philosophical thought, capable of ending the incompatibility of the postulates of sensationalism and rationalism.

The idea was first developed most clearly by Kant. He thought he had succeeded in making a radical change in philosophy thanks to discovery of the unknown third term

of understanding. While giving their due to the Lockean sensationalists who tried to trace the process of the ascent from separate perceptions to general concepts, Kant affirmed that it was impossible to pass from the sensory to the rational in that way, and that

> a deduction of the pure *a priori* conceptions of course cannot be made in this way.... It is therefore manifest that there can only be a transcendental deduction of these conceptions, and by no means an empirical one; also that all attempts at an empirical deduction, in regard to pure *a priori* conceptions, are vain, and can only be made by one who does not understand the altogether peculiar nature of those conceptions.[12]

He expressed himself even more categorically against the possibility of deducing cognitive understanding from the principles of logic. Any attempt to employ the data of logic

> as an instrument (organon) in order to extend and enlarge the range of our knowledge must end in mere prating; any one being able to maintain or oppose, with some appearance of truth, any single assertion whatever.[13]

He also subjected the thesis of the existence of an intellectual intuition that comprehended truth directly, by-passing the sense organs, to well-founded criticism.

Kant considered productive imagination, which generated a cognitive *a priori* synthesis, to be a third form of understanding, free of the one-sidedness of both empirical and rational knowledge, that made it possible at the same time to synthesise sense data. He made it the basis of the structure of his transcendental schema.

> Because every phenomenon contains a manifold content, diverse perceptions consequently are broken up in the mind properly considered and met as single details, so a connection is needed between them which cannot be in the faculty (sense) itself. We therefore have an active faculty (capacity) to synthesise these manifolds which we call imagination, and whose activity aimed directly at perception I call apprehension.[14]

When disclosing the process of 'apprehension' Kant found a place in it for the reproductive faculty of imagination and the associative connection of notions. But the content of his 'apprehension' differed radically from sensationalists' conceptions of the formation of general concepts from an aggregate of sense data. General concepts, according to him, are formed through the ordering of sense data in the human mind, which possesses a productive faculty of imagination, rather than through the direct building-up of sense data.

Because of the activity inherent in the mind, the final result of the formation of single and multiple perceptions in it differs qualitatively from the initial material because the sense perceptions are ordered according to certain rules given by a rational schema produced by the productive imagination, rather than as we wish them to be ordered. The multitude of scattered and isolated perceptions is thus reduced to a system and acquires unity in a determination of sensibility.

Productive imagination supplies perception with images, but these images differ from direct sensual ones.

> The Schema is, in itself, always a mere product of the imagination. But as the synthesis of imagination has for its aim no single intuition, but merely unity in the determination of sensibility, the schema is clearly distinguishable from the image. Thus, if I place five points one after another ... this is an image of the number five. On the other hand, if I only think a number in general, which may be either five or a hundred, this thought is rather the representation of a method of representing in an image a sum (e.g. a thousand) in conformity with a conception, than the image itself, an image which I should find some little difficulty in reviewing and comparing with the conception.[15]

The activity of the productive imagination is the source of the 'additional' property that general concepts—categories—possess, in contrast to the unique and differing data of sense experience.

On the other hand Kant's 'apprehension' also differs in principle from rationalists' notions of intellectual intuition. Productive imagination 'grasps' the general in phenomena, not through the mind's direct consideration of general patterns, by-passing the sense organs; on the contrary the activity of the imagination works, as it were, on sense data, putting them into order.

The thesis of the role of imagination in the process of understanding, when interpreted materialistically, is given deep content. Soviet philosophers and psychologists working in the field of analysis of the forms of understanding have often turned in recent times to clarification of the place and role of imagination in the cognitive process. The results obtained thereby have become so generally accepted that a description of imagination as a relatively independent form of understanding has begun to appear in textbooks on dialectical materialism on an equal footing with description of the traditionally known forms of sensory knowledge (judgments, perceptions, representations).

The weakness of the premisses of Kant's philosophical system did not allow him to disclose the real reason for the transition from sensory knowledge to logical understanding. He himself understood that substantiation of the role of productive imagination as the third link connecting the sensory and the rational required an answer to several questions. We shall touch on two of them. How is a synthesis of the sensory, 'apprehended' by the imagination, and the transition thereby from the sensory to the rational, possible if there are no general concepts in the sense data, i.e. categories, and categories are not reducible to an aggregate of sense data? Where is the source of the formation of this faculty of the mind that is called productive imagination?

Kant thought a satisfactory answer to the first question was possible if there were a mediating representation that was homogeneous with categories on the one hand and sense data (phenomena) on the other.

> It is quite clear that there must be some third thing, which on the one side is homogeneous with the category, and with the phenomenon on the other.... This mediating representation must be pure (without any empirical content), and yet must on the one side be *intellectual*, on the other *sensuous*.[16]

Underlying his transcendental schema (which, Kant thought, was this intermediate link) there was the representation of time and space. Kant understood time 'as pure inner contemplation'.[17] As for space, it 'is merely a pure form of the phenomena of external sense',[18] 'for the external sense the pure image of all quantities (quantorum) is space'.[19] According to him, inner feeling and external sensation were not equivalent. Preference was given to inner feeling, by means of which the subject in fact comprehended itself insofar as it operated internally on itself. His thesis about the inner activity or self-activity of the subject, as the source of productive imagination, was associated with the leading role of representations of time as 'the pure image of all objects of sense in general'.[20]

The thesis that representations of time and space have a most important place in the shaping of thought, in its materialist interpretation, is very profound. A time link between conditioned stimuli and unconditioned reflexes, accompanied with reinforcement, already inherent in animals at the level of sensory reflection of reality, in fact underlies the development of animals' complex conditioned-reflex behaviour. But Kant himself interpreted representations of time and space

from subjective idealist positions remote from their recognition as forms of existence of objective reality.

Since the mediating form of understanding that bridges lit sensory and rational levels was a purely subjective property of mind itself (in Kant's view), it was a faculty of productive imagination, and the latter had to do with unmediated sense data that in turn became facts of consciousness, understanding (knowledge) did not and could not go beyond the limits of the world of phenomena. The universality and necessity proper to categories therefore did not reflect an objectively existing inner connection of phenomena. In Kant's view active, creative role of understanding was not that men understood objective laws that did not depend on their consciousness, and employed them to transform the objective world in their practical activity, but that consciousness itself created laws (patterns) at its own discretion and prescribed them to nature.

> Consequently we ourselves import the order and regularity into phenomena that we call *Nature*, and they also cannot be found in phenomena unless we or the nature of our mind has originally put them there.[21]

Kant considered consciousness and the objective world to be separated by an impenetrable barrier, beyond which consciousness could not, in principle, go. If it could be admitted that this barrier were in any way surmountable, the capacity to do so belonged to faith rather than consciousness. The supersensitive 'dawning' by which faith 'apprehended' the essence of the 'thing-in-itself' that lay on the other side of the wall that consciousness could not penetrate was logically inexplicable, and therefore could not be classed as the subject-matter of science. As Kant himself remarked, he had to limit knowledge so as to free room for faith. As for the source of the productive faculty of imagination, he found no other answer than the assumption that it preceded any empirical understanding and was given *a priori*.

Despite his conviction that he had succeeded in solving the connection between sensation and reason through discovery of the productive faculty of imagination (a problem that his predecessors had struggled with unsuccessfully), Kant did not even try to explain the origin of this faculty, considering it an innate property of the human mind. Furthermore, he expressed himself extremely pessimistically (in accordance with his conclusions about the unknowability of the 'thing-in-itself') about the possibility of the mecha-

nism of the faculty of forming general concepts, and working with them, being discovered at any time in the future.

> This schematism of our understanding in regard to phenomena and their mere form, is an art, hidden in the depths of the human soul, whose true modes of action we shall only with difficulty discover and unveil.[22]

We have dwelt on the Kantian solution of the relation between the sensory and the rational in such detail because several of Kant's theses, which have still not lost their topicality, can be employed when we investigate the really complex mechanism of the transition from the sensory level of knowledge to conceptual thought, and so prove useful for further analysis of the problem we are discussing. We must allow, moreover, that the Kantian conception is often employed by today's philosophical schools in the main to construct subjective idealist schemes in epistemology and psychology (that is an essential feature of most neokantians' turn 'to the right' from Kant). A critical rethinking of the Kantian heritage has therefore not lost its significance for disclosing the gnosiological roots of the latest trends of idealism now reflected in the form of 'realism'.

Kant's idea of the need to introduce a third link determining the transition from sensory to rational knowledge was quite justified in its most general form. It is not fortuitous that many philosophers who do not go to the extremes of nominalism, solipsism, and idealist 'realism' of a Platonic hue, have turned to this idea. The famous English philosopher Bertrand Russell, for example, made several attempts to eliminate the contradiction between propositions affirming, on the one hand, that sense data are the sole source of our knowledge of the world, and on the other hand that our knowledge contains information about unperceived objects outside sensory experience. In his search for a satisfactory solution of this problem, moreover, he changed his point of view several times, passing from positions close to Berkeleianism to Humism, and then to a natural materialism. The range of his wavering between these extremes was indirect evidence, in fact, of the difficulties of coping with the problems posed. When summing up his unsuccessful attempts to deduce the process of understanding simply from sense data, Bertrand Russell remarked that he had previously limited himself too much to the verifiable and that the attempt to construct knowledge in terms of perception was ultimately simply an attempt to develop a certain technical hypothesis.[23]

Russell hoped to find the way out of the situation (when he moved away from Berkeleianism and Machism) by introducing some reliable principle of induction that would help 'unite' sense data and knowledge of objects that lay beyond direct observation. Back in the initial period of his work he had assumed that intuition and instinct must have a certain role in substantiating induction. Not seeing any possibility of disclosing the nature of his reliable principle of induction, he limited himself in the end to listing several postulates that (in his opinion) underlay the process of knowledge, but which were neither empirical nor logical (quasi-permanence, separable causal lines, space-temporal continuity in causal lines, common causal origin of similar structures, analogy). The real grounds for accepting them were deeply rooted, according to him, in the fact that they seemed inescapable, and that people had a propensity to rely on them.[24]

Rudolf Carnap also attempted to find third links mediating between the sensory and rational level of understanding. In his original phenomenalistic analysis he suggested that the middle link that made it possible to 'join' sense experience and logical thought was a relation of similarity in memory. In *Der logische Aufbau der Welt* he wrote that, since sense experience could not in itself be included in the logical system, there must be a relation expressible in terms of experience and at the same time suitable for the purposes of logic. This relation was that of resemblance in memory, which consisted in a close resemblance of remembered elements of experience. The whole system of knowledge and analysis that substantiated it was based on this relation.[25] The singling out of a relation of resemblance in memory enabled each more complex judgment to be analysed in terms of more elementary ones, until it was reduced to the basic relation of resemblance in memory.

The scheme of the origin of categories from sense data proposed by Carnap thus lay in the common stream of associationist attempts to identify categories with the invariant that is fixed in memory as a result of repeated observations. These attempts, as we noted before, ended in an impasse of 'bad' infinity, so that Carnap decided it would be better to abandon them. At the same time, however, he also had to abandon the universals themselves as general concepts that could reflect the necessary link between objective processes. True, he revised many of his earlier views not long before

his death, and began to share views of the existence of material objects (including unobservable ones) as the basis for constructs of logical systems that were close to a materialist understanding of the world.

Adherents of the hypothetical-deductive method deduce the role of a link that enables them to overcome the incompatibility of the postulates in sensationalism and rationalism from a special faculty of the knowing subject that can be called the faculty of advancing hypotheses. This faculty has a certain resemblance to the Kantian productive imagination, being a faculty of creating assumptions about the forms of connection in some ordered whole of various observed phenomena. These forms of connection themselves, moreover, go beyond direct sense experience; they are not observed, but are 'dreamed up' by the subject of knowledge. But after they have taken shape in the subject's head they can be confirmed (or refuted) by subsequent observations and experiments.

One of the fathers of pragmatism, Charles Peirce, pointed out the importance in the development of knowledge of 'qualitative induction', which consists in a process of bringing forward hypotheses and selecting them according to certain criteria (abduction), and a process of experimental testing, and rejection of those that do not stand up to the test (retroduction). The suggestion that hypotheses have a certain meaning (significance) in the growth of knowledge was later developed by many spokesmen of Western thought. The eminent American pragmatist John Dewey, for example, considered that hypothetical judgments presented a possibility of getting out of the situations of discrepancy or difficulty apprehended during experiment. According to him, a hypothesis

> involves a leap, a jump, the propriety of which cannot be absolutely warranted in advance, no matter what precautions be taken.[26]

The birth of a hypothesis defies control and involves

> the formation of habits of mind which are at once enterprising and cautious ..., the selection and arrangement of the particular facts.[27]

Dewey's thesis about the 'jump-like' transition from the sensory level of knowledge to the rational through hypotheses is not evidence of a dialectical approach on his part

to the solution of this problem. The solution does not consist, in principle, in explaining the passage from sensation to reason as the result of an inexplicable leap (a spasmodic transition to a new quality actually must take place), but in disclosing the objective criteria of this qualitative transition, showing its necessity, and explaining the nature of the mechanism of its operation that leads, by virtue of objective causes, precisely to that result and not some other. But Dewey did not manage to do that.

Dewey tried to dissociate himself from the extreme subjective idealist conceptions that reduce knowledge to purely psychological processes. He pointed out that biological factors in man's adaptation to his environment played a certain role in the process of understanding, and that certain logical operations included physical activity and called for the use of material instruments (e.g. microscopes and balances in a scientific experiment). The general premises and conclusions from his instrumentalism were nevertheless evidence that his conception did not go beyond the form of idealism represented by 'neutral' monism. Dewey considered the various forms of knowledge as instruments by which certain vague, unsatisfactory situations were transformed into definite, satisfactory ones. When that idea is given a materialist interpretation it is valuable, but it had a subjectively idealist sense to Dewey, since he considered the object of knowledge to be generated by the act of knowing itself. According to him the object of knowledge was 'subject-matter so far as it has been produced and ordered in settled form by means of inquiry'. The objects themselves were never simply given, but were manifested in experience only as 'the *objectives* of inquiry'.[28]

The faculty of the subject of understanding to generate and order the objects of inquiry (productive imagination, ability to put forward original hypotheses, etc.) began to attract more and more attention insofar as epistemologists' interest was shifted from problems of the logical substantiation of already available, ready-made knowledge to the discovery of patterns (laws) of creative thought that generate knowledge. There was thus, perhaps, a tendency to exaggerate this faculty (just as the sensationalists and rationalists exhibited an inclination in their day, each in his own way, to absolutise the role either of sense observations or of intelligent judgements). We must note that although Kant allotted an important place to productive imagination in

the process of understanding, he limited its place (as we have already shown) to the role of the middle link that made it possible to bridge the gap between the sensory and rational aspects of understanding. He repeatedly warned against those fruits of the unrestrained play of imagination that can grow in complete isolation from the soil of experiment and the requirements of reason. He remarked in a letter that only those statements are meaningful for a scientist that he can always repeat in experiments, while the ignoramus

> collects results that may well have been wholly generated from the imagination whether of the observer or of the observed person, and therefore cannot be subjected to a real experiment.[29]

He expressed himself even more categorically in another letter, remarking that imagination destroyed itself by its arbitrary action, degenerating into downright insanity;

> when the imagination is no longer controlled by reason and even conversely tries to enslave the latter, man falls from the state (sphere) of humanity to that of dreams and fantasies.[30]

In his day it could hardly be supposed that a time would come when some eminent natural scientists would not only be favourably disposed to putting forward 'crazy' ideas, but would also complain that lack of such ideas was holding back the growth of scientific knowledge.

A striving to regard understanding as a process of the growth of knowledge (which has its own history) is typical in particular of spokesmen of scientific realism, which arose in the 1950s (Thomas Kuhn, Imré Lakatos, Paul Feyerabend, and others). Without going into the particulars of this doctrine, let us dwell only on the aspect of it that relates to the problems of the 'middle link' in the passage from sensory to rational knowledge. In contrast to traditional epistemology these problems are considered now through the prism of the interconnection of the empirical and theoretical levels of understanding. It can, however, be noted that this point of view could not eliminate the 'blanks' left from the unresolved problems of the past. The non-inferability of theoretical knowledge from empirical knowledge and the irreducibility of the former to the latter, have become no less a stumbling-block to explanation of the mechanism of the rise of new knowledge than the incompatibility of the initial postulates of sensationalism and rationalism that tormented thinkers of the past.

An attempt has been made, moreover, to get around the 'tragic dualism' of the sensory and the rational, the empirical and the theoretical, by turning neopositive precepts 'inside out'. If the truth of general concepts and universals cannot be verified in fact by the data of observations, however far their finite series is extended (stretching to 'bad' infinity), a single observation is often sufficient to doubt their truth. For however often we have observed white swans, it is sufficient to see just one black one in order to find the falseness of the statement that 'all swans are white'. The question arises whether, having rejected the inductivist principle of verification, it is possible to affirm the principle of falsification in its place as the criterion for confirming the scientific importance of a theory, i.e. its refutation by just one empirically established or hypothetically possible fact. In that case the centre of gravity in explaining the pattern of growth of scientific knowledge is shifted to elimination of the old theory so as to make room for the new. But every new theory can only claim to be scientific when it in turn presents possibilities for its refutation. Every new theory must thus share the fate of the old one.

With that approach the growth of scientific knowledge looks like a chain of successive theories each of which is ultimately proved false. Properly speaking, they cannot even be called theories, if by such we understand some logically strict system of *reliable* knowledge. So we are concerned with systems of *hypothetical* knowledge, i.e. hypotheses.

Karl Popper took such a turn toward absolutising the hypothetical character of scientific knowledge. From his standpoint the development of scientific knowledge, being a process of the constant succession of hypothetical constructs, leads to the posing of ever more complex and refined problems. These constructs (for Popper, theories) are, as it were, a network (comparable in some respects with Kant's rational schema), that is cast onto the world so as 'to rationalise, to explain, and to master it'. And for that 'we endeavour to make the mesh ever finer and finer'.[31]

The opposition of the data of sensory experience and logical thought, of empirical fact and theoretical construct, seems thus to be overcome insofar as all empirical facts are 'theoretically loaded' (in the same way as Kant's mediating representation was on the one hand intellectual and on the other sensory).

As Popper himself wrote:

> My point of view is, briefly, that our ordinary language is full of theories; that observation is always *observation in the light of theories*; and that it is only the inductivist prejudice which leads people to think that there could be a phenomenal language, free of theories, and distinguishable from a 'theoretical language'.[32]

Many examples can be taken from the history of science, of course, when a fact became observable only after its existence had been forecast by a theory (genes in biology, the neutrino in physics, etc.). But that is scarcely grounds for saying that these facts, or the events manifested in them, only exist in imagination and the language of theorists.

Exaggeration of the role of productive imagination, and of the faculty to construct bold hypotheses, led in the final analysis to the conception of methodological anarchism. This faculty began to be treated no longer as the link that made it possible to connect the sensory and the rational, the empirical and the theoretical, but as something in which this opposition was dissolved rather than absorbed. Not only the difference between theory and fact but also that between science and myths disappears, as is typical of the conception of the American philosopher Paul Feyerabend. The scientist operates outside any rules of the rational whatsoever, but himself 'by his actions *constitutes* rationality'.

> A scientist is an inventor not only of theories but also of facts, standards, forms of rationality, in a word, an inventor of entire forms of life.[33]

According to Feyerabend, the process of understanding is directed by a passion that

> gives rise to specific behaviour which in turn creates the circumstances and the ideas necessary for analysing and explaining the process, for making it 'rational'.[34]

We are far from denying the significance of emotion in the creative endeavour of the scientist or from not seeing a common element in mythological and logical thinking, but we shall try to show later that the key to the complex problems of the interconnection of the various aspects of cognitive activity lies in the monistic methodology of dialectical materialism rather than in subjective conceptions in general and methodological anarchism in particular.

Thus the idea, profound in its posing, that if conceptual thought cannot be directly deduced from sense experience, some third link must be sought that would lead to the

transition from the sensory to the rational, could not find satisfactory solution in the conceptions considered above. We may also note that, inspite of the modifications in the treatment of the nature of this sought-after link, the conceptions that recognise the expediency of introducing it as an intermediary between sensibilia and universals have something in common.

(1) The attitude of the knowing subject to the object of knowledge is treated as their direct link in the classical dyadic subject-object scheme. The separate attempts to introduce such objects as the instruments used in understanding as the middle link between subject and object were not developed in these conceptions.

(2) The transition from sense perceptions to logical thought is treated exclusively as the product of the individual's subjective cognitive faculty, whatever name is given to it (productive faculty of imagination, faculty of making hypotheses, similarity in memory, etc.).

(3) It is recognised that the knowing subject is linked with the object of knowledge through his sense organs. This link is a direct one since the sense organs are an integral part of the knowing subject. Even if it is assumed that sense data play the role of intermediary between logical thought and the object of knowledge, the general formula of a direct link between the knowing subject and the object of knowledge is not altered thereby, because the difference between feeling and reason is traced only within the knowing subject.

Each of the theses considered above contains a pointer to some aspect of the cognitive process that may really be present in certain cognitive acts. Nevertheless, they lead, when taken in isolation from the general patterns of the development of knowledge, into a labyrinth from which there is no way out.

In fact, when the basis for differentiating the sensory and rational levels of knowledge is found only within the subject of knowledge we may conclude that we are capable of knowing only our own sensations. The subject's capacity to create general concepts from single and isolated sense data is thus treated as a mystic, incomprehensible faculty whose source is not amenable to rational explanation.

On the other hand, the thesis that, although the knowing subject deals only with his own sensations, but is at the same time linked through them with the object of understan-

ding, seems to make it possible to get out of the blind alley of solipsism. But since the subject's link with the object is thereby reduced simply to a direct connection, another difficulty arises that also seems insuperable. The organism's direct, unmediated link with the environment, taken by itself, excludes any possibility of 'grasping' the inner patterns, hidden from the sense organs of the course of objective processes. If we even grant that our sense organs are capable of directly 'grasping' the inner links of the objects of observation, we could not perceive them as anything distinct from the directly observed phenomena themselves.

Such an assumption leads to obvious paradoxes. Some hypothetical subject, while possessing a faculty of perceiving inner patterns directly (whether, it is called intellectual intuition, productive imagination, or what have you), might have perceived the law of universal gravitation from observing the starry heavens. But in that case Sir Isaac Newton's famous formulation of this law would have been indistinguishable from the visible movement of the planets. As Hegel remarked, the laws of celestial mechanics are not traced in the heavens. To discover the law of universal gravitation it took an immense expenditure of theoretical thought over the lifetime of many generations, before it was finally formulated as a mathematical equation that had no apparent similarity to the sense-perceived distribution of the planets.

The paradoxicalness of the assumption of a capacity to 'grasp' objective laws of nature independent of consciousness, by direct sensory perception, was already quite clear to Kant. But as it was also clear to him that we have no other channels of connection with the world around us than the data of the sense organs, he found no other way out (as we have already said) than to admit the inknowability in principle of 'the thing-in-itself'.

Attempts to introduce a three-term relation 'sensation—x—reason' were thus limited by this relation's being irremovable from the inner world of the subject of perception. As for the subject's relation to his environment, it boils down to his direct connection with the perceived object according to the classical 'subject-object' scheme.

The holders of metaphysical and idealist conceptions who tried to link sensibilia with universals by introducing an intermediate link started from an unhistorical approach

to the connection between the sensory and the rational. The question of the transition from sensory reflection of reality to a rational one as a process of the rise of consciousness during the evolution of life remained outside their field of view. They considered consciousness as formed, and already containing a difference between the sensory and rational aspects. Accordingly, the mediating representation (Kant's productive imagination, for example) was treated in the form of a 'link' between the sensory and rational inherent in man from birth, and given to him *a priori*.

Soviet philosophers and psychologists have paid much attention to the epistemological analysis of sense perception and its relation to rational knowledge. [35] Some have substantiated the thesis that the gnosiological relations expressed in the classical dyad 'subject-object' suffers from several essential shortcomings. This scheme has been subjected to well-founded criticism, in particular, in the work of A. N. Leontiev and K. R. Megrelidze.[36]

We are going to discuss in greater detail the point that the 'subject-object' relation reveals its limitation in the light of the fundamental propositions of dialectical materialism, which makes it doubtful that it can be used to analyse the transition from the sensory reflection to the rational. But insofar as we are concerned with precisely that aspect of the problem, it is convenient to cite some of the conclusions here of authors who are critical of this dyad. In Leontiev's work it has been substantiated that a three-member relation, i.e. 'subject-activity-object', is typical of man's connection with his environment, rather than a two-member one, the subject's activity thus being interpreted as a 'system with its own structure, inner transition and transformation, and development', rather than as a reaction or aggregate of reactions.[37]

According to Leontiev human activity does not exist in any other form than as an act or series of acts, although both these concepts reflect realities that are not coincident. The difference he draws between the concept of acts (or actions) pertaining to ends or goals, and the concept of operations that relate to conditions, is a real one. It is the fate of the latter that they sooner or later become the functions of machines and automata, dropping out of man's activity.

> The simplest technical division of labour must lead to the introduction of, as it were, intermediate, partial results, which

> are achieved by the separate participants in collective labour, but which are incapable in themselves of satisfying their needs.[38]

The needs of the members of the labour collective are met by a share of the product of their joint labour, which is distributed in accordance with the social relations arising. In that connection Leontiev made the very important (in our view) suggestion that

> this 'intermediate' result, to which man's labour processes are subordinated must also be singled out for him subjectively, in the form of a representation. That is also the singling out of the goal which, in Marx's expression, 'gives the law to his modus operandi'.[39]

We would quote another passage from Leontiev's writings:

> 'Subject-activity-object' transitions form a circular movement as it were.... But it is not at all movement in a closed circle. The circle is open, and it is opened precisely by sensory-practical activity itself.[40]

Megrelidze has suggested that labour and society, while mutually conditioning each other, represent a circular, closed formation, and that

> a certain 'centre' (focus) is distinguishable in the content of consciousness, from which and around which the whole field of consciousness is built as a mutually related, closed whole.[41]

Starting from the idea that the decisive factor in the transition from the direct sensory reflection inherent in animals to man's cognitive thought is labour, he singled out the role of the product of labour in particular as the material intermediary in relations between 'the subject and nature, and between the subject and other subjects'.[42]

Citing Karl Marx, Megrelidze put forward the idea that

> the instrument of labour (tool) as an external object rationally organised by man, who makes it the means of his activity, increases man's strength and extends his individuality far beyond his physiological limits.[43]

Tools are a special product of labour. Their specific feature is that, while the product of labour, a result of the labour process, they are at the same time involved in the labour process itself, entering it not simply as the product but in certain respects as the producer element. In the scheme 'man—tool—object of labour' the middle link is that element of the labour process without which material production is inconceivable in human society.

The sensory reflection of reality inherent in man's animal ancestors preceded the origin of rational reflection in time.

The latter, while a higher stage of reflection, could not help being genetically linked with the first stage. But since a direct link between these two stages cannot be substantiated, and the thesis of the existence of a mediating representation is put forward, it must be assumed that the middle link, in order to perform its connecting role, has to be linked with both the sensory (sensibilia) and the rational (universals). In that case the mediating representation must consequently have an internally contradictory, dual character. If it is taken as a subjective picture or reflection of objective events, then a determinant condition for its rise must have been the development of an objective determinant perceived on the one hand at the sensory level, while sense perception, on the other hand, must already have been inadequate for a psychic reflection of its features, which went beyond the possibilities of direct sense perception. In other words, the objective determinant must also have a dual, contradictory character. The problem of the mediating representation is thus based on the broader one of the origin of consciousness.

Before we can answer what is the mechanism of the transition from sense perception to abstract thought inherent in man as a formed rational being, we must discover the patterns of the natural, historical transition from direct sense reflection of reality by man's animal ancestors to its mediated rational reflection in the head of *Homo sapiens*. That faces us, it the first place, with the necessity to consider certain features of the reflection of reality at the level genetically preceding the origin of consciousness, i.e. at the level of the sensory world of animals (to which our next chapter will be devoted).

Notes to Chapter 1

[1] In order to avoid terminological confusion we would specify, that, for stylistic considerations, we shall make equivalent use of the various terms that mean respectively 'sensory' or 'rational', so long as no need arises in the course of the exposition to differentiate them. The expedience of this assumption is suggested as well by the fact that the authors of several of the philosophical conceptions examined here employed various pairs of terms (sensory-rational, sensation-reason, sensibilia-universalia,

etc.) to signify the two aspects (degrees) of knowledge mentioned.

As for the terms 'degree' and 'aspect', they also have a different sense content. Without dwelling on this specially, we would simply note that the term 'degree' indicates varying levels of knowledge, the existence of a transition from the sensory to the rational, while the term 'aspect' is used more often when examining 'formed', i.e. developed knowledge that already contains qualitatively different moments of the sensory and the rational.

[2] V. I. Lenin. *Materialism and Empirio-Criticism*, (Progress Publishers, Moscow, 1977), p. 111.

[3] *Ibid.*, p. 282.

[4] By 'metaphysics' and 'metaphysical method' is meant in Marxist-Leninist philosophy a way of thinking incapable of grasping the dialectical contradiction of development of the objective world and of the process of knowledge itself. Most Western philosophers adopting 'realist' positions in their positivist interpretation also oppose metaphysics, understanding by it any system of knowledge that declines to reduce the objective world to a complex of the subject's observations. From the standpoint of materialist dialectics the holders of these conceptions of subjective-idealist 'realism' can be justifiably classed as metaphysicists; they cannot cope with the task of constructing uncontradictory epistemological conceptions because a denial of the dialectical contradictoriness of the object world, which exists independently of the set of subjective sensations, underlies them.

[5] See Rudolf Carnap. *Logical Foundations of Probability* (University of Chicago Press, Chicago, 1950), p. 199.

[6] Hans Reichenbach. *The Theory of Probability* (University of California Press. Berkeley and Los Angeles, 1949), p. V.

[7] See Karl R. Popper. *Conjectures and Refutations. The Growth of Scientific Knowledge* (Harper and Row, New York, 1965).

[8] See *Hegel's Science of Logic*, translated by W. H. Johnston and L. G. Struthers (Allen & Unwin, London, 1929), Table of Categories, facing p. 24.

[9] *Hegel's Logic*, being Part One of the Encyclopaedia of the *Encyclopaedia of the Philosophical Sciences*. Translated by William Wallace (Clarendon Press, Oxford, 1982), pp. 272—273.

[10] Brand Blanshard. *The Nature of Thought*, Vol. 1 (The Macmillan Co., New York, 1940), p. 62.
[11] Gustav Bergmann. *The Metaphysics of Logical Positivism* (Longman, Green & Co., London, 1954), p. 45.
[12] Immanuel Kant. *Critique of Pure Reason*. Translated by J.M.D. Meiklejohn (J.M. Dent & Sons, London, 1934), p. 87.
[13] *Ibid.*, p. 69.
[14] Immanuel Kant. *Kritik der reinen Vernunft* (Verlag von Felix Meiner, Hamburg, 1956), p. 176A.
[15] Immanuel Kant. *Critique of Pure Reason*, pp. 118-119.
[16] *Ibid.*, p. 117.
[17] Immanuel Kant. *Kritik der reinen Vernunft*, p. 181A.
[18] Immanuel Kant. *Critique of Pure Reason*, p. 106.
[19] *Ibid.*, p. 120.
[20] *Ibid.*
[21] Immanuel Kant. *Kritik der reinen Vernunft*, p. 184A.
[22] Immanuel Kant. *Critique of Pure Reason*, p. 119.
[23] P.A. Schilpp. *The Philosophy of Bertrand Russell* (Northwestern U.P., Evanston, Ill., 1944), p. 718.
[24] See Bertrand Russell, *Human Knowledge. Its Scope and Limits* (Simon & Schuster, New York, 1948), p. 488.
[25] See Rudolf Carnap. *Der logische Aufbau der Welt* (Weltkreis-Verlag, Berlin, 1928), p. 72.
[26] John Dewey. *How We Think* (Heath & Co., Boston, Mass., 1910), p. 75.
[27] *Ibid.*
[28] John Dewey. *Logic. The Theory of Inquiry* (Henry Holt & Co., New York, 1938), p. 119.
[29] *Kant's Briefwechsel*, Vol. 2 (1789-1794). (Verlag von Georg Reimer, Berlin, 1900), p. 140.
[30] Immanuel Kant an Alexander Fürst von Beloselsky (Sommer 1792). *Traktaty i pis'ma* (Nauka, Moscow, 1980), p. 633.
[31] Karl R. Popper. *The Logic of Scientific Discovery* (Hutchinson, London, 1959), p. 59.
[32] *Ibid.*
[33] Paul K. Feyerabend. From Incompetent Professionalism to Professionalized Incompetence—the Rise of a New Breed of Intellectuals. In *Philosophy of the Social Sciences*, 1978, 8, 1: 43-44.
[34] Paul K. Feyerabend. *Against Method: Outline of an Anarchistic Theory of Knowledge* (New Left Books, London, 1975), p. 26.

[35] A survey of the state of development of this problem in the Soviet literature will be found in particular in the article 'Lenin's Theory of Reflection' by A. M. Korshunov, Yu. A. Dorodnykh, V.S. Evdokimov, and V.V. Mantatov in *Filosofskie nauki*, 1973, 6.

[36] See A.N. Leontiev. *Problems of the Development of the Mind* (Progress Publishers, Moscow, 1981); *idem*. The Problem of Activity in Psychology, *Voprosy filosofii*, 1972, 9: 95-108; *idem*. Activity and Consciousness, *Voprosy filosofii*, 1972, 12: 129-140; K.R. Megrelidze, *Osnovnye problemy sotsiologii myshleniya* (Basic Problems of the Sociology of Thought), Tbilisi, 1973.

[37] A.N. Leontiev. The Problem of Activity in Psychology, *Voprosy filosofii*, 1972, 9: 98.

[38] *Ibid.*, p. 104.

[39] *Ibid.*; Karl Marx, *Capital* Vol. 1. Translated by S. Moore and E. Aveling (Progress Publishers, Moscow, 1974), p. 174.

[40] A.N. Leontiev. Activity and Consciousness, *Voprosy filosofii*, 1972, 12: 130.

[41] K.R. Megrelidze. *Op. cit.*, pp. 49-51, 115.

[42] *Ibid.*, p. 101.

[43] *Ibid.*, p. 142.

2

Did Hume Think Animals Perceive the World?

One of the fundamental achievements of materialism in explaining the rise and development of consciousness was discovery of the decisive role of labour in the evolution of man from the apes. That discovery largely determined the special attention that experimental and theoretical psychology has paid for many decades to the anthropoid apes. As man's closest relatives, morphologically and genetically, they also take first place in level of development of mental capacities among all the other members of the animal kingdom.

The anthropoid apes are capable of resorting, in certain situations, to use of a kind of rudimentary tool, an object of the environment that is available ready-made or is even partly 'worked up' by the apes themselves. Evidence of that is the well-known fact that apes display a capacity, in artificially created situations, to manipulate objects that are within their sensory field, for example, sticks, and even to 'make' such rods by biting off surplus bits of objects that outwardly resemble sticks. A stick in the paws of an ape and the savage's spear, in any case, have this in common that they extend the natural dimensions, as it were, of their bodily organs, without being living attachments of them, and serve as a mediator between the living organism and the environment.

On the background of established views of the close genetic kinship of apes and man, reports about the discovery of species in the animal kingdom with a highly developed psyche proved unexpected. That applies in particular to dolphins, whose surprising responsiveness to training, and ingenuity,

have been confirmed by scientific observations and experiments. Leaving aside sensation-mongering statements about their being rational creatures, one can still not help wondering how it became possible for psychic properties to develop among dolphins that are in no way inferior in complexity, in the view of some workers, to those of anthropoid apes. Neither their habitat nor their bodily organisation give grounds for supposing that they may have used the naturally given objects employed by anthropoid apes as a kind of forerunner of tools. But isn't it precisely the transition to employing external objects as tools that led to the complicating of the psychic activity of man's ape-like ancestors on the road to the rise of consciousness?

The new data of the natural sciences have heightened interest in such traditional philosophical problems as the origin and essence of consciousness, and have made the role of labour in its genesis again a topical question. This interest has been roused, in particular, by the advances of cybernetics, and efforts to model thought process on computers, and the transfer of propositions about the existence of extraterrestrial civilisations from the field of science fiction to that of scientific search, and so on. It has been suggested, moreover, that a high degree of psychic activity may have been 'evolved' on the basis of other factors than labour, and that 'man's mental development is beginning to be considered a partial case of genetically different paths of evolution of the psyche'.[1]

The suggestion that labour is one, but not the only possible way of the origin of thinking beings merits our further attention. It must not be forgotten that assertions about consciousness having a source outside labour are widely employed, and still used, to construct anti-scientific conceptions that treat the problems of the origin and essence of consciousness from both a frankly religious and a sophisticated idealist position. But that is not grounds for consistent adherents of dialectical materialism to reject as unscientific the thesis that there may have been various paths for the origin of reason. On the contrary, our task is to show that, if there really could have been several paths by which consciousness was formed, there is nothing mystical about it, and that the scientific significance of such an assumption can be substantiated precisely from the methodological positions of dialectical materialism.

First of all, let us assume that man owes his origin as

a thinking fragment of the material world precisely to labour. Hypotheses about other ways of the forming of rational beings cannot ignore this point, if they are built on a materialist basis, or in any case cannot help treating it as a realistic version of the genesis of consciousness.

On the other hand, an important methodological proposition follows from the doctrine of the material unity of the world, from Lenin's theory of reflection, and from the dialectical unity of the general and the particular, namely that the origin of consciousness through labour is only a particular phenomenon, and that the general pattern of its genesis must seemingly be manifested in it. The particular does not exist out of context with the general. In this case our task, consequently, is to try and explain whether or not there is something about labour that should be considered a common invariant factor for other possible situations of the rise of highly developed forms of ideal reflection of reality similar to human consciousness.

The radical difference between the psyche of even highly organised animals and human reason is usually seen as being that while the sensory level of reflection of reality is available to animals, entry to the field of logical operations and conceptual thinking is closed to them. It is thus the faculty of forming and operating with concepts in accordance with certain rules (on the basis of sense perception or together with it) that is the criterion that makes it possible to class a subject among rational beings (whose sole representative on Earth is *Homo sapiens*).

But where does this faculty come from? Can conceptual thinking be derived from the evolution of sensory reflection? The answer to that is associated with important epistemological conclusions. At the same time disclosure of the mechanism of the transition from sensory reflection to the rational is directly related to explanation of the historical process of the transition from the psyche of prehominids to consciousness, to determination of the boundary between the psyche of animals and the mental activity of man, to the heuristic problematic, etc.

The eternal and natural condition (as Marx put it) of the life of any organism, including man, is the exchange of matter (metabolism) between the organism and its natural environment. In that respect man cannot be viewed outside the living world, being only one species among its numerous representatives. At the same time, however, men make

their exchange of matter with nature in a way qualitatively different from animals. The animal's relationship with the external world is characterised by a direct, unmediated link along the lines of 'organism—nature'. Man interacts with nature in an indirect mediated way, putting natural objects that he has altered between himself and nature as an intermediary. This intermediary is a part of nature that has come to be called second, or 'humanised', nature.

Marxism demonstrated, for the first time, with strict scientific precision, that man, unlike animals, interacts with external nature to a determining extent along the pattern 'man—humanised nature—nature'.[2] The dyad 'subject—object' does not take that important fact fully into account. The epistemological relation 'subject—object' reflects features of man's actually existing relation, as a living organism, to his environment. Unlike the concept of the direct relationship between the organism and the environment, which we have expressed in the form of a two-member relation 'organism—nature', the concept 'subject' already includes the idea that the living organism (man) interacts with nature by means of tools, and is a rational being.

But tools, as an objective given quantity that is not a natural organ of the human body, are not numbered among the 'subjects' and in that sense do not form part of the objective reality that is reflected in the concept 'subject'. The concept of the tool differs, too, from that of 'object', when we understand by the latter nature (the environment) in its virgin form, because a tool is a part of nature created by man himself by transforming its objects and forces in the labour process into objects and forces that he puts into his use as an intermediary between himself and nature. A tool is therefore an object that represents 'humanised nature' or a 'subjectivised object'.

Since we apply the term 'subject' in the accepted sense to a thinking, rational being, and do not use it in relation to animals, we shall, in order to avoid terminological confusion and for sake of brevity, depict the direct relationship between the living organism and the environment symbolically by

$$S \rightleftarrows N$$

where S is the living organism and N the environment. This relationship, characteristic of species of non-rational living organisms, contains the premises of the rise of rational

beings, because man was moulded as a result of the natural historical process of his differentiation from the animal kingdom.

Theses on the activity of the living organism as an integral, self-governing system, on the functional mechanism of anticipating reflection, and on the role of orientation in behaviour have been put forward and developed in the work of Soviet scholars (N.A. Bernstein, D.N. Uznadze, P.K. Anokhin, and others). In basing ourselves on these, we would like to touch simply on those aspects of the complex relationship of the living organism and the environment that relate to the problem of the transition from sense reflection of reality to rational, abstract reflection.

The living organism, being the objective result of the self-development of inanimate nature, is at the same time an organised part of nature that has its own qualitative features. It is an integral system with an inherent drive to preserve its integrity, and to self-reproduction, or (to use the broader term proposed by Bernstein in relation to the living organism) a drive to maximum negative entropy. This drive is realised in the course of the organism's activity, which has two aspects—internal and external.

The internal aspect of activity is the functioning of all the elements of the animate system's structure in their interconnection as a single whole. There is a limit to breach of the inner functional links beyond which the elements of the integral system must break down and the system die, and the organism lose its internally inherent drive to negative entropy. This striving requires energy and material resources whose assimilation by the organism enables it to counter the action of the objective law of entropy. Their source is the environment. The external aspect of the organism's activity is primarily the process of assimilating energy and material resources available in the environment and needed to sustain life and maintain constant reproduction of the organism as an integral system. In the absence of these resources, or with the rise of conditions in which they cannot be assimilated by the organism, the inexorable operation of the law of entropy clearly leads to death of the organism.

These two aspects of activity form a unity. During activity the animate system transforms elements of the environment, and includes them into its inner, integral organisation. The process of its activity thus functions as integral activity, and the system itself as an active entity.

For the drive to survive (maximum negative entropy, reproduction of its integrity) that is built into the animate system to be realised successfully in the course of its activity, it must obviously possess a form of reflection specific to it and differing from the forms of reflection existing in inanimate nature (according to dialectical materialism reflection is a universal property of matter). We call this form of reflection, innate in animals that interact with the environment directly by the scheme $S \rightleftarrows N$, as well as in humans, feeling or sensory reflection.

We stipulated earlier that we would use the term 'animate organism' in the narrow sense. In the broad sense it of course includes bacteria, plants, protozoa, and other organisms. But for the purposes of our exposition it is sufficient to limit it to those branches of the tree of life that are almost exclusively represented by the Chordata, and predominantly by higher animals. By direct sensory reflection as a property of living organisms we shall therefore mean the sensitivity inherent in a number of species limited by this reservation.[3]

With more detailed consideration it is clear that an animate system could not survive if it did not (1) possess a faculty of somehow reflecting and 'feeling' itself precisely as a living entity. This faculty, which is expressed in the systems's drive for self-preservation, can be called an *instinctive feeling* (instinct) *of self-preservation*. This instinct, so understood, is a kind of integral background (field) of experience that makes it possible to 'evaluate' external and internal events by a single criterion, namely whether or not they are conducive to the organism's drive to survive. Stimuli fixed by the organism as signals of certain events are projected onto the integral background of the instinctive feeling of self-preservation, taking the form of positive or negative *emotions*. If the change in the situation is favourable for survival, the emotions are positive; if it is dangerous, or harmful for life, the emotions are negative. Any situation is accordingly experienced as satisfactory or unsatisfactory.

An animate system could not survive (2) if it did not have a faculty of reflecting in some way changes taking place in its inner functional organisation. Its normal functioning thus requires (as we have already said) replenishment of its material and energy resources. The fixing of a shortage of these resources is projected onto the background of the instinct for self-preservation, taking the form of an emotio-

nally experienced feeling of an unsatisfied need (e.g. of hunger). On the contrary, bringing of these resources to the vitally necessary level is experienced as a feeling of satisfaction of a need. This sensory reflection of changes in the inner state of the organism we call a *sense of need.*

(3) A necessary condition of the organism's survival is the existence of a faculty in it to reflect situations in the environment as a source of vitally necessary resources and as the external field of its life activity, into which it is plunged, and changes in the parameters of which (within limits unacceptable to the organism) lead to its death. The initial facts of sensory reflection of the environment are *sensations.* Sensations of one sort or another are also 'evaluated' in the form of positive or negative emotions. Combinations of sensations with an incomplete or isolated character, passing through the 'filter' of the integral background of the instinct for self-preservation, are given a certain order and integrity, and become perceptions. This aspect of sensory reflection we call *perception*, in accordance with the accepted terminology.

External irritation not connected with events of vital importance to the organism is not fixed after repeated reactions at the emotional level in its characteristic form of experience of opposing (favourable—dangerous) situations. Because of the undifferentiated nature of such irritation as regards the drive to preserve life, it is also not reflected at the level of perception. In that way the animate organism fences itself off from excess information.

The process of active interaction with the environment could not, furthermore, ensure the organism's survival if it did not reflect the direction of its activity toward passage from the unsatisfactory situations it experiences to satisfactory ones, and toward search for conditions favourable for life in the environment. This direction is realised in movement of the organism (for many species of animal it also includes spatial motion). This aspect of sensory reflection can be called *kinaesthesia.*

Sensation and sensory reflection thus display a complicated structure already at the level of a relatively primitive animate system, still far from its transformation into a rational being. It follows from recognition of a striving to maintain life internally inherent in an animate system that sensory reflection is manifested in various, albeit interconnected aspects. The role of the link connecting the various data of sensory reflection into a whole is thus performed by the

instinctive feeling of self-preservation as self-reflection of the system itself in its drive for maximum negative entropy and for reproduction of its integrity precisely as an animate system. The kind of orientation that has a special place in determining the general direction of the animal's actions thus rests on the instinct of self-preservation.

Allowing for that, let us turn to consideration of the organism's direct interconnection with the environment along the lines of $S \rightleftarrows N$. This relation is characterised, on the one hand, by the organism's active effect on the environment and, on the other hand, by the latter's influence on it, in the space-time continuum that it enters from the moment of its origin. In the one case, and the other, the interaction $S \rightleftarrows N$ is realised through the living organism's activity, during which it obtains means of existence and responds to vitally important influences of the environment that do not depend on it and therefore require adaptation to them.

The process of activity consists of a chain of individual actions, each of which has its result, so that the total result, which consists in survival of the organism, is realised through a multiple series of separate results $r_1, r_2, r_3, \ldots r_n$.

However each separate result differs from the others, a certain recurrence of elements is characteristic of the series. This stems from the objective patterns of the motion of matter in general, and in particular from the evolution of the animate system itself as part of the material world. The system encounters recurrence of processes in the environment (caused, for example, by the Earth's revolution around the Sun and its rotation around its own axis), from its very inception. It is logical, furthermore, to suppose that not only is the animate system included in the external, objective recurrence of processes, but that this repetition also occurs within it, since life itself is engendered by that very nature that later opposes it as the external environment.

There are now many experimental findings that confirm that most animals and plants are capable of measuring intervals of time, even in conditions of constant illumination. They preserve the rhythm of physiological processes and behaviour, i.e. possess inner biological clocks to orientate them in time. Interest in this has grown so in recent decades that modern biology has given rise to a special field of biorhythmology, whose subject-matter is this phenomenon. Most of those working in that field have come to the conclusion that the rhythmic activity of living organisms depends to

a large extent on endogenous (internal) causes rather than on exogenous (external) ones.[4]

We would like to draw attention, in that connection, to an aspect of the 'organism-environment' problem that has long been the subject of keen discussions in biology and philosophy. Which of these two aspects is the leading, determinant one in the evolution of life as a special biological form of the motion of matter, the organism or the environment? Idealists, of course, isolate inanimate and animate matter from one another explaining the latter, moreover, as underivable in principle from the former. In one way or another they assume that it is impossible to give a determinist explanation of the evolution of life, regarding the activity of living organisms as not governed by any objective laws, and considering that the unpredictable will of the living organism's own choice underlies its behaviour. The reaction of materialists to that position is quite definite; the formation of species and behaviour of the forms of animate matter are determined, and the source of that determination must be sought in the environment.

Darwin's theory of natural selection, which followed from the proposition that living organism' adaptation to the environment in the course of the struggle for existence had a leading role as the cause of the origin of species and their mode of behaviour in fact laid the basis for a scientific explanation from the standpoint of dialectical materialism of the mechanism of the operation of biological laws. Idealist conceptions suffered a major setback as regards its scientific and ideological consequences. But it is sometimes forgotten, in that connection, that the assumption of the external conditioning of species formation and animal behaviour does not exclude the existence of inner patterns of the development of living organisms, and that vital activity is determined from within to some extent as well as from outside. This oversight has frequently been employed to refute Darwinism. More and more evidence has been gathered in biology that mutations (changes suddenly arising in the structure of inheritance responsible for storing and transmitting genetic information) underlie the inherited variability of living organisms. Mutations do not, in fact, have an adaptive character, and may arise spontaneously, without visible links with changes in the environment. Mutation theory was actually in seeming contradiction with the Darwinian theory of natural selection until their initial

assumptions were synthesised, and natural selection began to be considered as the natural selection of mutations.[5]

Efforts to employ the critique of Darwin's scientific conceptions to attack philosophical materialism are clearly unsound, as well as regards problems of the interconnection of internal and external factors in species formation and the behaviour of living organisms. Anyone acquainted with the principles of Marxist-Leninist philosophy will confirm that the determinant source of change, evolution, and motion lies, according to dialectical materialism, within a material system and not outside it, and is not a push from outside but is conditioned rather by inner contradictions existing in unity and 'struggle' within the concrete material system, and within the material world as a whole. That position makes it possible to regard any change as *self*-change, i.e. an intrinsic, internally necessary, self-produced change of the system that is determined by its contradictions, which mediate the effect of external factors and conditions.[6] That also applies to animate systems. The dialectical materialist approach to explaining the origin of life as a special more highly organised form of the motion of matter than inanimate nature must obviously be linked with recognition of the cardinal thesis that animate nature is the natural product of inanimate nature in the course of the latter's gradual evolution. But if that is so, the 'building material' of the first living cell could only have been 'materials' of inanimate nature, and nothing more (quantum mechanical elements, fields, bodies, etc.). The determined links of the inanimate elements could not help being included, therefore, though in altered form, in the internal connections of the elements of the first living cell. Whatever this transformation was, the living cell must have been determined internally from the outset, because, as regards its inner aspect, it was part, because of its initial state, of that same determined nature, which began to oppose the cell from its inception as the environment (medium) as a special part different from the cell. The materialist thesis about the conditioning of the evolution of life by external factors therefore not only does not refute, but on the contrary presupposes the existence of internal, relatively independent laws of the functioning and evolution of living organisms. Thus, if living organisms did not have an impulse to maintain and continue life built into their structural organisation, there could be no possibility of their chan-

ging in the course of adaptation to changes in the conditions of the environment.

As regards the objective necessity of a cyclic recurrence of the processes taking place within an organism, this is manifested in particular, in a constant replenishment of vital resources being necessary for the organism's reaction to the law of entropy; satisfied needs become in time unsatisfied, which in turn leads to a need to repeat the cycle of actions to satisfy the unsatisfied needs. Since this cyclicity is vitally important, it must obviously become fixed by the organism at the level of sensory reflection as a recurrence of results in the general series of its actions.

A very important circumstance is brought out here (which has not received due attention in the philosophical literature), viz., in spite of the fact that recurrence of the results of the organism's activity is ultimately based in an objective interconnection of the phenomena of nature, the direct source uniting these results in animal's psyche into some sort of interconnected whole is all the same not the objective laws of the natural environment but the laws of the active integrity of the animate system itself. Given its direct interaction with the environment, the results (which consist in the chain $r_1, r_2, \ldots r_n$) cannot be linked together outside their direct link with the system's activity.

Direct sensory reflection of the temporal links of any phenomena is unable to bring out their essence as causal connections operating with objective necessity. Experiments in producing conditioned reflexes in animals quite convincingly confirm that. In certain experiments with dogs that were regularly fed after the flashing of a lamp, they secreted saliva, anticipating the appearance of food, in response to the next flash. The switching on of the lamp and the delivery of food had no causal relationship, and were deliberately done by the experimenter. But in the dog's brain a connection was established between these successively repeated events (the flashing of the lamp and the receiving of food).

The direct basis for the establishment of this link is obviously not an objective causal connection of the phenomena in the environment, but the internal active unity and autonomy of the animal's organism requiring satisfaction of a need for food. With disappearance at the end of the chain of the successively repeated reinforcing event (the receiving of food) the conditioned reflex also fades with time, and the animal ceases to react to the conditioned signal. If

we began to treat the reflection of the recurrence of phenomena of the environment characteristic of the organism's direct relation with it as reflection of a cause-and-effect relationship, the hooting of a train would have to be considered the cause of its movement.

The results of an organism's activity are embodied externally in the environment as changes introduced into it by the organism. With the origin of life and rapid rise of living forms, a biosphere came into being and began to evolve that altered the face of Earth substantially. Biological equilibrium, reproduced in ever more complex form in the course of the natural evolution of terrestrial life, is manifested in a host of connections and relations between living organisms and both inanimate nature and themselves. As Frederick Engels remarked:

> Animals ... change the environment by their activities in the same way, even if not to the same extent, as man does, ... on the island of St. Helena, goats and pigs brought by the first arrivals have succeeded in exterminating its old vegetation almost completely, and so have prepared the ground for the spreading of plants brought by later sailors and colonists. But animals exert a lasting effect on their environment unintentionally and, as far as the animals themselves are concerned, accidentally....
> In short, the animal merely *uses* its environment, and brings about changes in it simply by its presence.[7]

Since the results of animals' activity expressed in changes in the natural environment produced by them are made 'as far as the animals themselves are concerned, accidentally', one must obviously distinguish that aspect in the chain of animals' effective actions which has a necessary character. All these actions and results are such as are necessary for the maintenance and reproduction of life, because life would simply become impossible without them. Consequently, we have to investigate any chain of recurrent events from the aspect of inner activity directed to maintaining life and to self-reproduction of the organism as a living, integral system.

If we employ the 'stimulus—reaction' formula for this, it turns out that the leading stimulus of behaviour during the organism's direct relation with the environment, in this sense too, is the instinct of self-preservation, with the animal's drive stemming from it to transform a situation dangerous for life, by its activity, into one satisfying the conditions for maintenance of life (e.g. satisfaction of a phy-

siological need for food, defence, or safety through flight from an attacking enemy, etc.). The moment of satisfaction of the need for food is thus the end result of a chain of certain actions in which the connection of its links is 'closed', so as to be repeated again when the need arises. Without an unconditioned-reflex reinforcing link of the satisfied need, this whole periodically repeated chain of actions could not be formed.

But because the environment is the sole source of replenishment of the animal's vital resources, changes in it (irrespective of whether they are brought about without the animal's involvement or are caused by its actions) assume the character of intermediate results in the chain of events leading to unconditioned reflex reinforcement. The fixing of the chain of these intermediate results in the animal's psyche becomes an external stimulus directing its behaviour to achievement of a given 'end' result.

Intermediate results may therefore be regarded as elements perceived by the organism as signals, i.e. stimuli, and the organism's responses in its interaction with the environment as actions.[8]

Conditionally designating the satisfactory and unsatisfactory situations reflected in the animal's psyche respectively by the symbols r_h and $r_{\bar{h}}$, the signals by the letters $r_1, r_2, \ldots r_n$, and the actions by arrows $\overset{1}{\rightarrow}, \overset{2}{\rightarrow}, \ldots \overset{n}{\rightarrow}$, we can write the cyclic recurrence in the chain of actions leading, for example, to satisfaction of the need for food, as follows:

$$\boxed{r_h} \rightarrow \boxed{r_{\bar{h}}} \overset{1}{\rightarrow} (r_1 \overset{2}{\rightarrow} r_2 \overset{3}{\rightarrow} r_3) \overset{4}{\rightarrow} \boxed{r_h},$$

where r_h is the feeling of a satisfied need for food; $r_{\bar{h}}$ is a feeling of hunger; $\overset{1}{\rightarrow}$ is the search for food; r_1 is the sensation of the odour of an external object that has previously served as food; $\overset{2}{\rightarrow}$ is movement in the direction of the arriving odour; r_2 is visual perception of the object; $\overset{3}{\rightarrow}$ is movement toward the object to contact with it and test it by taste; r_3 is the palatable sensation of the object as the expected food; $\overset{4}{\rightarrow}$ is the eating of the food; r_h is the feeling of the newly satisfied need for food, and so on.

When we interpret our shorthand note of the sequence of events in the form of a linear chain $r_1, r_2, \ldots r_n$ we must bear in mind each time the detailed record deduced above of cyclic recurrence in the chain of the animal's actions, because this sequence in reality includes cycles of closed-open effective processes. 'Closing' thus occurs in this chain at points where situations unsatisfactory from the aspect of the drive to prolong life are transformed into satisfactory ones. Account must be taken, of course, of the fact that this cycle of actions and results has not only an external aspect, but also an internal one, i.e. that they are not reducible to recording the outer behaviour and its directly observable results, but also include inner (e.g. biochemical and bioelectrical) effective processes of self-regulation of the animal's vital activity.

Let us isolate the mechanism of the forming of that aspect of sensory reflection called *sensation* and *perception* from the general characteristics of the organism's interaction with the environment, and consider it in more detail.

From what we have already said about perception, it can be concluded that an animate system originally perceives objects and phenomena of the external world (e.g. form, colour, temperature) not simply as a set of separate sensations (e.g. round, yellow, warm), but through the correlation of perception of the object with the evaluation criterion of an instinctive sense of self-preservation, and experiencing perception thereby in the form of a positive or negative emotion.[9] Thus, if a given round, warm, yellow object is useful for maintaining life, it is perceived as something that causes a positive emotion, in contrast, for example, to a black, cold, square object that is dangerous for life, which in turn evokes a negative emotion. But each of these objects is perceived separately at this stage as something coherent and connected. In the perception of the first object, for instance, there is still no difference between round, yellow, and warm; all these properties of the object are perceived coherently and undifferentiated.

Let us suppose, furthermore, that there is a third round, black, warm object in the organism's environment, contact with which is dangerous, although the first and third properties coincide with the similar properties of the first, wholesome object. The difference consists solely in the colour. The faculty of distinguishing the third object from the first becomes vitally important. There consequently arises a neces-

sity to single out yellow colour from the coherent perception of the first object and black from the perception of the third, and to make a difference between them. This difference is also fixed by the organism through projection of the perceived objects onto the field of the instinct of self-preservation.

We could give more examples, but it will be clear from what we have said that at the organism's most elementary level of perception of its environment, the latter is perceived in the form of an opposition of two aspects, differentiated by a single criterion, which consists in the organism's striving to survive. At that stage perception and sensation still coincide with one another, or rather perception and sensation are still one and the same thing. But from the elementary cellule of perception, which contains these oppositions, ever richer perceptions by living creatures of the world in which they live arise in the course of evolution. While each of the two differentiated, opposed aspects is still perceived initially as something coherent and undifferentiated, further evolution leads to the singling out and differentiation in perception of various properties, objects, and relations of the environment.

This process is, at the same time, one of complication and differentiation of the living cell itself as an integral system. While it did not initially possess specialised sense organs to fix various events and objects of the environment, such organs (of touch, vision, hearing, etc.) developed of vital necessity in the course of evolution. A multiple series of perceptions arose from the elementary cellule of perception through differentiation of opposites, each perception having on the one side a certain integrity or wholeness, and being differentiated on the other into a multiple series of singled-out sensations (round, yellow, warm, hard, etc.).

From the standpoint of the natural historical process of the evolution of sensory reflection, it must thus be said that the coherence of perception is not built up from an aggregate of sensations, but is differentiated on the contrary from such an aggregate. In other words a perception is a differentiated entity, not an integrated one. But if the organism of an animal is regarded, in abstraction from the whole preceding process of the evolution of life, as already given, and as the final result of that process, then its perception of the environment is represented in the form of an integrated entity of various sensations. Therefore, when defining per-

ception through an aggregate of sensations, we must not forget that it is possible to integrate sensations into a certain unity because perception itself took shape historically as a differentiated entity.

The absence of an evolutionary approach is largely responsible for the erroneousness of a number of psychological conceptions when the relationship of sensations and perceptions is being explained, an erroneousness that gets its extreme expression in the opposition between associationist and gestalt psychology. The associationists' attempts to obtain an integral perception through a summation of sensations were doomed to failure because the source of the integral character of sensations remained outside consideration, since the wholeness of the aggregate of separate sensations does not consist in them themselves but arises in a genetic unity of perception-sensation, and ultimately lies in the inner integrity of the sensing organism itself as a material animate system.

The adherents of gestalt psychology correctly noted the error of associationists' views, and experimentally confirmed the fact of the integrity (wholeness) of perception, which is not reducible to an aggregate of separate sensations. But they, in turn, not having discovered the source of this integrity, absolutised it, idealistically 'objectified' it, and isolated it from the subjectivity of sensations. The integral formations of perception began to be interpreted as some sort of independent substances like Leibniz's monad.

Allowing for what we have said, let us consider certain aspects of the mechanism of perceptions from the example of an already formed, 'ready-made', animate system possessing a certain set of specialised sense organs. Because of the sequential recurrence intrinsic both in the processes of the organism's vital activity itself and in the phenomena of the environment, the organism repeatedly comes up against similar situations in its interaction with the environment. At the next encounter with a situation that has already occurred in the past it takes the results of the previous meeting into account, as it were, in order to determine the direction of its future actions. If an external object that satisfied some need of its in the past, for instance, is yellow, it will display heightened interest in yellow colour.

Experiments have established that many species not only of mammals but also of other animal organisms with a less developed nervous system (i.e. insects and fish), have the capacity to differentiate shape, size, colour, etc. to some

degree or another. It has been shown, for instance, by changes in the colour, shape, and size of the feeding rack of acquarium fish that after several repeated experiments the fish display a clearly expressed faculty to distinguish a circle from a triangle, a big triangle from a smaller cirlce, a yellow triangle from a black one, etc. They select precisely those trays from others, with a high degree of certainty according to shape, colour, and size, on which food was previously found. A conditioned reflex had been established in them.

Let us now touch on an aspect of complex conditioned-reflex activity. When an animal is capable of choosing precisely a yellow triangle of a certain size from several objects of different shape, size, and colour, does that mean that it performs an operation of differentiating and identifying objects of the environment such as'a triangle is not a circle', 'yellow is not black', 'this object, like that one, is triangular', 'yellow is yellow', 'this triangle is bigger than that circle', and so on? Or, speaking the 'language' of sensations, does it mean that the animal establishes the difference and identity of sensations by association of the sensations themselves with one another?

Members of the associationist trend in philosophy and psychology are inclined to answer that in the affirmative. From their standpoint, since a yellow object is always a yellow object, the invariance of an object's yellowness is fixed through many repeated observations (through similarity in memory) as a common property of it. All its other properties that are not discovered through repeated observations are cut away in the same way that a sculptor creates a statue from a shapeless granite slab by chipping away all the surplus stone. The invariant, in this sense, is periodically repeated signals that are singled out through repeated superpositions of each other on the chaotic ('surplus') background noise precisely because they are repeated periodically and so distinguished from noise (i.e. there is a fixing of the difference between periodically repeated signals and chaotic, 'surplus' noise).

These associationist conceptions (as already said) do not stand up to criticism either historically or logically. They have also been refuted by experiment. Aquarium fish distinguish yellow from some other colour, not because they have established an identity 'yellow = yellow' through direct comparison of a number of sensations of yellow, but because the sensation of yellow is associated with the posi-

tive emotion of a satisfied need for food. It is not the repetition of the sensations in themselves but the repetition of the emotions evoked by these sensations that underlies an animal's capacity to single out certain phenomena in special groups according to their similarity. In other words, it is not an association between two sensations that takes place here, but an association between sensation and emotion.

The chain of results of an animal's separate actions during its direct interaction with the environment is thus linked in its psyche through correlation of each of them with the inner emotional experience evoked by them. Information about events in the outside world accessible through the sense organs is not perceived by an animate system as a simple mirror reflection of them, but is actively transformed by the system.

This process can be represented in very simplified form as follows. Vitally important external irritation perceived is projected along nerve channels on the neurophysiological 'screen' of the self-preservation instinct, so receiving an emotionally experienced 'appreciation'.[10] This projection leaves a trace on the screen, preservation of which through periodic repetition of analogous irritation creates conditions for an expectation of the previously experienced emotion. The capacity to preserve traces of experienced sense perceptions in a neurophysiological 'memory or storage device' has an important place in the mechanism of anticipatory reflection of reality. The perceptions of events preserved in the memory, after they no longer exist, are traditionally called *representations*.[11] Since the emotionally experienced consequences of previous events are fixed by a living organism in its memory, new impressions of them are 'appreciated' now in a certain dependence on the results of past experience. A time connection arises between the traces of emotional 'appreciations' and sensations of a given stimulus. Since the sensation of yellow is repeatedly preceded by an earlier positive emotion of satisfaction of the need for food, this sensation is experienced as expectation of a similar emotion. The experience plays the role of a set-up of sorts determining the animal's choice of the chain of subsequent, fruitful, effective actions in response to this sensation: viz., movement toward the yellow object to the point of contact with it; the finding of food; swallowing of the food; satisfaction of the need for food. It happens that when the first result begins the animal anticipates in ad-

vance, as it were, the occurrence of the end result in the future, forestalling the development of events.

Prof. P. K. Anokhin, Fellow of the USSR Academy of Sciences, wrote, when describing the principles of anticipatory reflection of reality:

> Pavlov's discovery of the conditioned reflex was essentially the discovery of anticipatory reflections of the external world in a highly specialised substratum, viz., the nervous system. In fact, when a dog secretes saliva in response to a bell, that happens not because the saliva must 'digest the sound' but rather because food is going to appear soon that will have to be digested. Consequently, by virtue of repetition of a sequence of definite effects of the environment we have created a line of simplified reactions in which the first impulse is sufficient for a chemical reaction of protoplasm to spread like that of a miner's fuse along the nervous system in the future, anticipating the subsequent development of external events.[12]

Something similar also happens, in spite of its specific features, when there are periodic changes in the conditions of the environment, for example, with the succession of the seasons, or of day and night. Regular rhythmic recurrence of events, caused for example by seasonal phenomena (spring—summer—autumn—winter—spring ...), over the millions of years of the adaptation of life to external conditions, has developed in animal organisms a mechanism of inner biochemical restructuring (remarkable for its purposefulness) that anticipated the happening of subsequent events. That is displayed in the fact, that when a phenomenon which evokes the initial result is fixed by the organism, the internal chain of biological (physiological) processes leading to the subsequent results, is switched on.

Such anticipatory reflection of reality is clearly discoverable even in insects, which prepare in good time to survive the severe conditions of winter. As an illustration we may cite the example, given by Prof. Anokhin, of the biological restructuring that takes place in the organism of the larva of a certain species of wasp.[13]

The grub's body contains much water, yet surprisingly it does not perish in frosts of —40°C (frozen water should destroy all the protoplasmic compound sin its cells); it turns out that with the onset of the first autumn frosts glycerine is rapidly formed and accumulated in the grub's cells, considerably lowering the critical freezing point.

At the same time such anticipatory reflection is only 'an information model of the probability of the occurrence of

the anticipated event'.[14] When the previously repeated sequence of external events is altered by some cause, the inner processes in the living organism, operating with the previous sequence, lead to disturbances of the balance in its connections with the environment and, depending on their seriousness, to death of the organism.

During adaptation to changing conditions of the environment, many species of highly organised animals, however, have acquired a capacity to avoid the fatal 'miner's fuse' reaction, and have learned when necessary to stop or suspend the sequence of inner processes triggered off. That increased their chances in the struggle for existence, and made it possible to react more flexibly and selectively to unexpected changes and situations suddenly arising in their relationships with the environment. A hungry predator, for example, that has received a visual or olfactory signal of the proximity of presumable prey, goes in pursuit of it and attacks it. But if the supposed prey puts up fierce resistance that is dangerous, the predator will prefer to alter the programme of its behaviour radically, despite its hunger, and save itself from harm.

The origin of ever more complex forms of sensory reflection, dictated by living necessity, went hand in hand with complication and differentiation of the animate systems themselves, involving the material substratum of anticipatory reflection, including the nervous system. Along with congenital experience having the character of unconditioned reflexes, a capacity emerges in highly developed animals to form conditioned reflexes, and to accumulate individual, intravital experience both by imitation of the example of parents and in the course of 'self-training'. But however complicated the forms of psychic reflection of reality were, at the level of the organism's direct link with the environment according to the two-member scheme $S \rightleftarrows N$, this reflection could not pass from fixation of phenomena to discovery of their essence, or to discovery of the operation of inner, objective causal connections in the external sequence of events. It could not happen because in the organism's direct relationship with the environment, it is not the external world that operates as the direct source of the systematic integration of perceptions but the active integral character of the animate system itself in its striving to survive.

In that connection we must specially stress that the statement made above is wholly in agreement with the thesis of

the objective content of sensibility developed in works on the theory of knowledge of dialectical materialism. In fact, 'the recurrence of instinctive actions already necessarily reflects the pattern of reality'.[15] If it did not, animals simply could not adapt themselves to life in conditions of an environment existing and changing independently of their behaviour. But the objective content in animals' direct sensory reflection of reality is not perceived by them as an objective content. The animal interacting with its natural environment according to our two-member scheme, does not and cannot know about the patterns of reality. It only adapts to them, reflecting the objective order of things, their properties and relations as an orderliness of its own behaviour that enables it to maintain its integrity as an animate system, and to realise its instinctive, unconscious striving to continue life. If animals could philosophise, they would have incontrovertible grounds, from their standpoint, to claim that it is they who introduce order and a regular connection into phenomena of the natural environment.

The real paradox is that uncritical transference of the scheme $S \rightleftarrows N$ to analysis of people's conscious activity creates the illusion that it is the human mind, rather than nature, that is the creator of order and regular connections in nature; and that illusion is taken seriously as the allegedly scientific grounds on which subjective idealists erect their philosophical systems. One of the epistemological roots of subjective-idealist conceptions lies here in fact, including attempts to substitute a doctrine of probability relations, as a surficial consequence of recurring events, for determinism.

With the two-member 'subject—object' scheme, the objective premises for passing from sensory reflection of reality to its logical reflection remain outside the field of view.

Notes to Chapter 2

[1] V. P. Tugarinov. *Filosofiya soznaniya* (The Philosophy of Consciousness), Mysl, Moscow, 1971, p. 48.

[2] 'Humanised nature' can be interpreted in the broad sense of the term as the whole cultural environment that men have created in the course of their social and historical practice, including both material and spiritual culture. But since it is not a matter in this case of men's relations to each other, but of the aggregate of their relations preci-

sely to the natural environment, the term 'humanised nature' is used here in a narrower sense, to signify those objects and forces of the natural environment that man has transformed by his labour and put into his service. As for the concept 'human', or 'man', it is used here as a generic one, i.e. to designate a certain whole aggregate of men living and acting together, united, for example, in a primitive clan, rather than the separate 'isolated' individual.

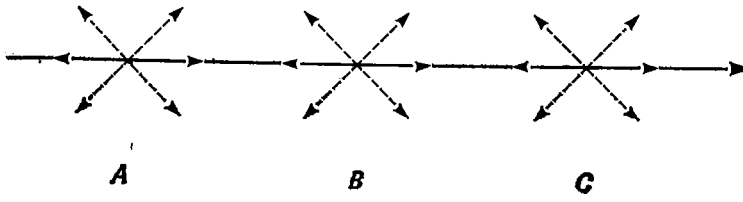
[3] The problem of the transition from irritability to sensibility is outside the scope of our book. We would refer readers to the works of A. N. Leontiev, in which he treated the problem of the interconnection and difference between irritability and sensibility stemming from the interconnection and difference between directly vital and indirect (orientating) external influences (see his *Problems of the Development of the Mind*, sections I and II). Allowing for the fact that we have in mind the sensory reflection already formed in animals and are considering it in very general form, signal effects (e.g. the hum of an insect perceived by a frog) and direct vital functions (e.g. the frog's swallowing of the insect) do not go beyond the limits of our $S \rightleftarrows N$ scheme.

It must also be stressed that the development of reflection at the level of consciousness transforms the sensory level of reflection qualitatively as well. At the same time there is something in common between the analysers of humans and animals, since man's sensuality is genetically linked with the sensibility of his animal ancestors. Consideration of the qualitative difference between sense reflection in animals and man should therefore be preceded by explanation of the transition from sensory to rational reflection. In any case, sensory reflection is 'living contemplation' of reality, which includes, in accordance with the historically determined evolution of the sensory apparatus, perception of light, sound, smells, etc.

[4] See Ritchie R. Ward. *The Living Clocks* (Knopf, New York, 1971), p. 305. See also V. B. Chernyshov. The Precision of Biological Clocks. *Priroda*, 1974, 12: 87-88.

[5] In order to visualise the idea of the relationship of the internal and external factors in inherited variability, the following simplified scheme is suggested. Let us depict the direction of possible mutations of an organism by broken

arrows radiating in various directions, and the trend of changes in the environment by a solid arrow. Then the mechanism of natural selection of mutations of a number of organisms (*A*, *B*, *C* ...) will appear as follows:



In this scheme mutations have a greater chance of survival the more the direction of their realisation coincides with the trend of changes in the environment.

[6] See the entry 'Dialekticheskii materializm' in *Filosofskaya entsiklopediya*, Vol. 4 (Sovetskaya entsiklopediya, Moscow, 1967), p. 550.

[7] Frederick Engels. *Dialectics of Nature*. Translated by Clemens Dutt (Progress Publishers, Moscow, 1974), pp. 178-179.

[8] See A. V. Napalkov and N. V. Tselkova. *Informatsionnye protsessy v zhivykh organizmakh* (Information Processes in Living Organisms), Vysshaya shkola, Moscow, 1974, p. 24.

[9] The idea of a close connection between sensation and the emotional background of experience has already been developed in the Soviet philosophical literature (see, for example, I. S. Narsky. A Contribution to the Problem of Reflection of the Properties of Objects in Sensations. In *Problemy logiki i teorii poznaniya* [Izd-vo MGU, Moscow, 1968], pp. 50-61). We must note, however, that sensations, perceptions and representations are sometimes treated in isolation from the emotional aspect of sensibility in a number of works on dialectical materialism devoted to sensory understanding and its forms, especially in textbooks.

[10] Our use of the term 'appreciation' when considering the emotional relation of animals to stimuli is arbitrary, because it is usually employed to designate a human capacity rather than an animal one. Although this relation could be designated by other words (e.g. 'emotional over-

tone'—I. S. Narsky), we have refrained from introducing a new term, assuming that the reader will be able to understand from the context in what sense we are using 'appreciation'.

[11] It remains debatable whether animals have the faculty of forming representations. Without going into this question, we would note that animals' capacity to retain traces or 'image copies' in their memories of previously encountered, vitally important situations, objects, etc., has been confirmed by many observations, and there is no doubt about its existence.

The problematic character of this question is something else, namely whether animals are capable of evoking in m mory, and reproducing images, of a previously experienced situation in the absence of a similar situation, or whether a reproduced image arises only when it is 'provoked' by an effect. Man, of course, is capable of creating reproduced images and using them irrespective of whether the events that generated them exist at the moment.

[12] P. K. Anokhin. The Philosophical Sense of the Problem of Natural and Artificial Intellect. *Voprosy filosofii*, 1973, 6: 95.

[13] *Ibid.*

[14] See B. S. Ukraintsev. *Samoupravlayemye sistemy i prichinnost'* (Self-Regulating Systems and Causality), Mysl, Moscow, 1972, pp. 150-151.

[15] See A. M. Korshunov. The Role of Perception in the Process of Understanding. In F. I. Georgiev et al. *Chuvstvennoe poznanie* (Izd-vo MGU, Moscow, 1965), p. 117. See also I. S. Narsky (Ed.). *Problemy logiki i teorii poznaniya* (Izd-vo MGU, Moscow, 1968), pp. 3-76.

3

Humanisation of Nature

The propositions made above that mediating representations play an important role in the transition from sensory reflection of reality to its rational reflection, and that the subjective faculty of creating such representations must have an objective determinant cause, face us with the task of making a more detailed examination of the radical difference in the interaction of animals and of men with their environment. The difference is that, while an 'organism—nature' relationship is characteristic of the former, a 'man—humanised nature—nature' one is characteristic of the latter. We shall now concentrate on analysing the features of these latter relationships.

It will readily be noted that the middle link in this relation is, on the one hand, the product of the labour of man himself (embodying precisely the human aspect) while on the other hand, it retains its natural basis, in spite of man's processing of it, in the sense that it interacts with objects of nature as a natural object.

Among the whole variety of things comprising the 'second' nature by which men have 'fenced themselves off' from virgin nature, means of production have a very important place, especially tools, as the main link mediating man's relation with nature. It is therefore expedient to distinguish the following relation 'man—tool—nature' from the general formula characterising man's relation with nature, and to examine it specially. Two key moments are clearly distinguishable: (1) man's action on the tool; (2) the effect of the tool on the natural environment.

The fundamental qualitative difference of this indirect, mediated relation of man and his environment from the animal's direct link with its medium is that man, by his actions, makes the tool, i.e. nature altered by himself, work for him. The results of the action of a tool on objects of nature differ radically from the results of man's direct action on the tool. The difference is that the end results of man's action on objects of nature mediated by means of a tool contain a substantial 'addition' to the results of his own efforts; and this 'addition' consists, as it were, in an increase, transformation, and speeding up of his physiological functions through the action of the artificial organs that he has created. The property of tools that interests us is therefore that of serving as a kind of additional factor to human efforts.

Men bring forces latent in tools into action which begin a self-movement relatively independent of them. However the primitive stone axe of antiquity differs from the modern machine tool, they have this in common, that both are natural objects transformed by man and put into his service. But a simple comparison of a stone axe and a machine tool already shows how far man has advanced on the road of mastering objective laws so as to make them work for him.

A tool, while possessing signs of a relative 'self-action' (within more or less narrow limits), is a definite, connected whole that has a certain autonomy in relation both to man and to non-humanised, virgin nature. It can consequently be regarded as a kind of system (taking the concept of a system developed in science as a certain entity of many elements united by certain interactions).[1]

Since all three members of the relationship 'man—tool—nature' that we are considering are linked together by an interaction and constitute a certain unity, this relation as a whole can itself be regarded as a kind of system, but one of a higher order than the system 'organism—nature'. That is already clear from the example of the relation that existed at the dawn of humanity (elementary from the modern standpoint) of 'hunter—throwing spear—animal'. The interaction of the elements of this broader system can be expressed by the formula

$$S \rightarrow M \rightarrow N$$

in which S is the man who puts the tool into action, M is the tool operating on the natural environment, and N is that

part of nature that is effected by the tool (and called the object of labour).[2] The arrows indicate the direction of the effect of the elements of the system on one another. Function $\rightarrow M$ is effected by man's physiological efforts expended on bringing the tool into action. Function $\rightarrow N$ completes the action of the tool (as a whole or through some of its elements) on the object of labour.

The active, 'actuating' part of the whole system 'man—tool—object of labour', it will be seen, is man himself. It is he who puts the whole three-member system into action. Without the application of his physical efforts, which fulfil the function of operating with tools, the system $S \rightarrow M \rightarrow \rightarrow N$ could not even arise; and when these efforts cease to be made, it sooner or later ceases to exist as a system, having lost its integrity and the interconnection of its parts.

On the other hand, man's application of his own efforts to a tool may cease as soon as they have fulfilled their role of actuating factor leading to movement of the tool. At that moment, which represents the end result of his direct action on the tool, a process of relatively independent movement of the tool begins, i.e. its 'self-action'. A spear, for instance, thrown by a man, flies without intervention of the thrower as soon as it leaves his hand. The distance and direction of its flight depends on the initial speed and direction imparted to it by the thrower, the resistance of the air, and other objective conditions. The tool's independent motion has its end, determined by the context of its resources of 'self-movement' that have been brought into action. The result of its interaction with the object of labour is the obtaining of a product of labour that serves to satisfy man's needs. The interaction of the elements of the three-member system is thus, on the one side, continuous (as an on-going process), but on the other discontinuous (as a result of this process).

The interconnection of the continuous and discontinuous in this interaction is manifested in the result's being the end (a break in the continuity) of the preceding process and, at the same time, the beginning of the next. Man's action on the tool ceases, in fact, as soon as it has led to prolongation of the process through actuation of the tool's 'self-movement'. Things then happen 'of themselves', as it were, according to the laws of objective causal connections so long as the conditions are preserved in which those links continue to operate. At that stage, if there is intervention by man, it is of quite a (qualitatively) different character:

his efforts are now concentrated on maintaining conditions for continuance of the mediator's self-movement, rather than on actuating it, so long as this interference does not exceed the limits of his physical possibilities in each concrete case.

Here we may cite primitive man's use of fire as a mediator between himself and the environment. (Its mastery was an enormous stride in his taming of the forces of nature.) Rapid friction of wooden objects on one another calls for the application of physical effort so that the heat thereby emitted will be sufficient to ignite dry grass. But when that result has been achieved, the action of the person who has made fire changes qualitatively. It now consists in maintaining the process of combustion by adding dry twigs, and then bigger pieces of wood to the ignited fire. Having caused a chain reaction of combustion (started by mediator M), man brings into action forces of nature itself latent in the mediator, which leads to results that he could not have achieved directly. He cannot melt metal by the heat of his own body, but he can kindle fire from sparks he has struck, and smelt metal by it.

The result obtained through the action of a mediator on the object of labour is the end of the process $S \rightarrow M \rightarrow N$, insofar as this result is objectified in something capable of satisfying man's needs. But the process of the exchange of matter and energy between the human organism and nature (being an eternal, natural condition of existence) cannot be ended with once-only consumption of the product made. Consumption must, of vital necessity, be renewed, which inevitably leads to the beginning of a new cycle of the production of the object of consumption. This circulation can be represented in very simplified form by the following scheme:

$$\begin{array}{ccc} & M & \\ \nearrow & & \searrow \\ S & \rightleftharpoons & N \end{array}$$

Its constant renewal is an integral part of the production and reproduction of human life; it is characterised by continuity and is a manifestation of movement and change. The result, on the contrary, appears as an interruption, completion, consummation; it is a section of the process, 'a single frame of a moving picture film', as it were.

Let us designate the result of man's action on a tool by the symbol R_a, and the result of the effect of the tool on the object of labour by R_b.

It will readily be noted that there is a radical difference between the relation of the results in the chain $r_1, r_2, \ldots r_n$ considered in the previous chapter, characteristic of the direct link between animals and the environment, on the one hand, and the relations of the results R_a and R_b. The difference is that, whereas the results are linked together in the first case simply by the inner active integrity of the living organism itself, they are associated in the second case through the action of an external object, objectified in relation to the organism, i.e. a tool. The link between the results of an animal's effect on the environment does not, therefore, have any 'addition' to its own efforts, while the result of the effect of a tool on the object of labour contains a substantial 'addition' that cannot be reduced simply to man's physical efforts.

A very primitive pointed object in the hands of a savage during a hunt, or in repelling an attack, enabled him to achieve successes that would have been unattainable through operations performed by his 'bare hands', even if the physical effort exerted by the primitive hunter had been sufficient for it in either case. A sharp weapon would increase the hunter's strength tenfold. Where does such an 'increase' of strength come from?

That question could now be answered by any schoolboy who knows, for example, the physical law of the differences in the results of the action of one and the same force on an object in accordance with the area of its application, a law that permits a person on skis to slide over deep snow, while he would sink into it if he were on stilts, though his weight is unchanged.[3] The effect of this objective law is due to the fact that a sharp, pointed object can pierce a victim, which could not be done by the blow of an unarmed hand.

The appearance of an 'addition' to the savage's own efforts when he employed such an object as mediator between himself and the environment consequently stemmed from the fact that he put the operation of an objective law of nature to his use. He had not the slightest idea, of course, of the action of that objective law, or of any other. The practical application of external means of adaptation that preceded tools (which may conventionally be called instruments of pre-labour) did not stem from knowledge of objective laws, but was dictated by the rigorous conditions of the struggle for existence. On the other hand, man's ancestors, employing very primitive tools as a mediator between themselves and

nature, were already employing the separate results of the operation of those laws in their life activity.

The question arises whether the 'addition' to the physical efforts proper of man's ancestors through the use of instruments of pre-labour is linked with the 'addition' that distinguishes the rational level of the reflection of reality from the sensory. That supposition merits attention, since moments can be discovered on the path of the emergence of this addition that throw still more light on the mechanism of the origin of consciousness as a causally conditioned process with an objective basis.

The difference between the results of actions by 'bare hands' and those with the aid of instruments of pre-labour could obviously not help find reflection in the psyche of prehominids that were forced to resort more and more to regular use of instruments (tools), since this difference was of vital importance and was perceived already at the level of sensory reflection as a certain superficial sequence of events. At the same time grasping of the features of this difference went beyond the bounds of its possible reflection at the sensory level. The whole course of evolution led to a time when of necessity there was a qualitative transformation of the sensory level of reflection of reality to a new, higher level. The initial 'material' for that transformation was prepared by the whole course of preceding natural evolution.

The fact that the transition to constant use of external means of adaptation that preceded tools helped man's ancestors to see new objective links between objects of the external world is one of the most important and broadly accepted theses of the materialist explanation of the evolution of man from apes. This thesis (ignored by holders of subjective conceptions of the genesis of consciousness) makes it possible to explain the objective determination of the transition from sensory reflection of reality to its reflection in the logic of concepts. But the answer how, precisely, the qualitative change in the reflection of the external world in hominids' psyche caused by the appearance of these new, objective connections came about, does not follow automatically from acceptance of this thesis.

The transition to a higher level of reflection must have been accompanied with changes in the material substratum of reflection and the development of new functional links in the organism's neurophysiological structure, because cons-

ciousness is a function of a material body, the human brain. That question interests us, however, mainly from another aspect, namely from the angle of the change in the forms of psychic reflection of reality, and of discovery of the logical mechanism of the transition from the sensory to the rational. The logical difficulty in answering this question is that it is a matter of disclosing the logic of the origin of logic itself.

Since a subject has no other sources of information about events than sense data or sensibilia, and reason operates with general concepts or universals that are not directly reducible to sensibilia, the transition from sensibilia to universals must have been associated with the existence of some intermediate link that played the role of logical equivalent in the transition. Kant's clearly formulated question about the need to introduce a mediating representation, similar on the one side to intellect, and on the other to sense data, had a solid foundation but it did not, as we said earlier, get a satisfactory answer from Kant (or his successors), because the nature of the representation was treated subjectively and lost in a labyrinth of idealistic, transcendental schemata. Although a faculty of creating concepts and operating with them according to certain rules is inherent in the subject rather than the object, nevertheless the origin of this faculty itself must be substantiated as the result of a natural, historical process. Without that condition it is impossible to get a truly scientific answer to this problem.

According to Lenin's theory of reflection, a representation or notion is a subjective image of the objective world. The same supposition applies to the mediating representation; a necessary condition of its origin must seemingly have been the appearance in objective reality of an object that could get reflected in the head of man's ancestors precisely as a mediating representation. To do that the object itself must have had a mediating character.

The subjective image has an objective content not dependent on the subject. The mediator-object that found reflection in a mediating representation must therefore have been an object existing objectively as an object of the environment independent of the subject. But since a notion is a subjective image of an objective object, this mediating object must have belonged to the subject and have included an element of subjectivity. Its mediating character must consequently have consisted in its performing the role of mediator between

the subject and the object, and its containing something in common from both sides.

The transition of man's ancestors to regular use of external objects of adaptation (which we have conventionally called instruments of pre-labour), caused by vital necessity, also signified the development of such a mediating object. The dual, contradictory character of this object, its 'kinship' with both the subject and the object, consists in a tool's being, as it were, an extension of the organism's bodily organs, yet operating on another external object precisely as a natural object on an object of nature.

The use of a mediator-tool must, furthermore, have led to the development of results that were fixed at the level of direct sense perception, on the one side, as a certain sequence of events, while, on the other side, this sense perception itself must have had a content of something that went beyond the possibilities of direct sense perception, fixing on arising need for a transition to reflection of inner objective connections not accessible to direct perception.

Constant use of instruments of pre-labour led to the appearance of just such results. In fact, the difference between the results of the actions of the 'bare hand' and those with the help, for example, of a sharp instrument was so obvious that it could not help being noted at the level of direct sensory reflection. Nevertheless man's ancestors, using a sharp object as a mediator could have examined and felt it many times, felt pain from pricking their own bodies by its point, but no sensory associations could have formulated the physical law in their brains through whose operation the point could pierce a victim's body with incomparably greater success than the unarmed hand. For the savage the instrument was literally a 'black box', the essence of whose action he could not explain, but whose manifestation he felt in his experience as a substantial addition to his own efforts.

The time had come for a qualitative leap in the development of psychic reflection of reality. Between the fixing in S (the memory of man) of result R_a (the effect of man's ancestor S on instrument M) and result R_b (the effect of instrument M on natural environment N) there arose a new psychic link in the brain of man, who was becoming differentiated from the animal kingdom. This link differed qualitatively from reflection of the relations $r_1, r_2, \ldots r_n$ characteristic of the living organism's direct relationship with its environment. This newly arising link reflected the fact that re-

sult R_b, of vital importance for the living organism, was the consequence of the action of some force external to it, embodied within the object-instrument, a force that at the same time was brought into play by the organism's own actions that led to result R_a. In other words, a link was already grasped between different results R_a and R_b, not as a superficial sequence of events but in the form of a notion of the instrument's capacity to give an addition to the organism's own physical efforts, thanks to the existence of some internal, mysterious force in the instrument hidden from the eyes.

A guess arose initially in the brain of prehominids that they had called forth and brought into play, by their own efforts, inner forces of objects of external nature in order to get results vitally necessary to them. Figuratively speaking, this guess still did not signify the dawning of the sun of reason, but it was a first flash of lightning illuminating the dark night of the preconscious with the light of thought. Supposedly, this guess signified the rise, in the field of the material, neurophysiological substratum, of a new level of connections between brain centres, in which results R_a and R_b had already been fixed as interconnected according to the scheme of direct sensory reflection, i.e. through their emotional 'appreciation' by the organism. The new level of neurophysiological link corresponded, moreover, to an interconnection of these results, objectified as regards the organism, and perceived through the 'independent' mediating activity of the external mediator-instrument. From that moment the moulding of man as a rational creature, and his transition from the sensory to the rational stage of knowledge, began. The first human concept, differing qualitatively from sense perception, consisted in grasping the fact that some force latent within things lay behind their external, sense-perceivable appearance. The concept thus penetrated into things, which ceased from that moment to be simply 'things-in-themselves' for man.

In that way, it was not the similarity in memory of similar results of sensory experience, but on the contrary the establishing of an inner connection between the different results stemming from the use of an instrument, that underlay the transition from sensibilia to concepts.

Primitive man, without knowing the true nature of this newly discovered interconnection, attributed a faculty of self-action to the instrument on a level with his own capa-

city to perform actions. The various actions of other men, and of encountered animals, constantly perceived at the level of direct sensory reflection, could not generate such an association without the development of an external object that could be brought into action precisely along the lines of $S \rightarrow M \rightarrow N$, i.e. by man's ancestor's own actions.

As we have already remarked, the mechanism of the formation of associations consisted, with a direct relationship between the living organism and the natural environment, in correlation of the reflection of objects of the environment with the organism's emotional 'appreciation', rather than in a direct correlation of the reflected objects with one another. Now, however, with relations with the environment mediated by tools, the mechanism of association, while including the previously attained level, was no longer reducible to it. With the development of tools man's own action was extended, as it were, into the action of the tool (because it was set in motion precisely by his action), but at the same time the mediator-tool was not a living extension of the human body, and remained an object of the environment. Man's feeling of self-movement, therefore, was transferred on the one hand to the motion of the tool, and on the other hand was fixed as the tool's capacity for self-action, since the gap between its actuation and its action on the object of labour was obvious. Such a transfer of man's actions to the action of the tool led to this, that whereas the activity of the living organism had previously been reflected solely as a sensory, internally experienced fact relating to the organism, it was now reflected as well as a fact of experience relating to the internal properties of an object of the environment. The tool was now regarded as a feeling, animate object capable of independent action. But, having 'breathed life' into objects of the external world, man's ancestors also 'exalted' themselves, and took the important step of distinguishing themselves from the natural environment as a special force. Man's ancestors' guess about the source of the 'addition' to their actions, hidden in the mediator-tool, received a naive, animistic form: the dead, inanimate, tool was now treated as a living body.

In spite of the naiveté of the first animistic views, they exhibited a reflection of the world at a new, previously unattainable level of ideal reflection. For all its primitiveness, the animistic picture of the world already contained a kernel

of truth, which consisted in a guess about the existence of objective relations in nature, of the existence of inner sources of self-movement in the external world. The great revolutionary significance of that discovery was not in the least reduced by the fact that the savage did not yet, and could not, know the true cause of the self-movement, any more than by the fact that, when using a tool in his activity, and in practice putting the objective laws of nature to his service, he did not have the slightest conception of them.

It took whole epochs of development of mankind's practical and cognitive activity before any of the objective natural connections were explained, and the dialectical materialist law of the unity and struggle of opposites was formulated as the source of the self-motion of matter. But the first step toward that had already been taken then, when modern man's ancestors guessed the existence of some inner, inherent, active force hidden behind the external appearance of objects of the environment. That guess took the primitive, naive form of ascribing a spirit to these objects; this act also contained the hidden 'secret' of the 'addition', which subjectively laid the basis of the qualitative difference between conceptual thought and the aggregate of direct sense data.

We must very definitely stress that, although the emergence of this 'addition' also contained an abstract possibility of subjective mystification of objective processes, there was in fact nothing mystical in its origin. Its emergence has its scientific explanation precisely as an *objectively* determined process. For, before man's subjective faculty to form concepts containing an 'addition' to the aggregate of sensibilia developed, an 'addition' to the results of the direct exertions of his ancestors had already arisen in objective reality itself, caused by forced transition to constant use of instruments of pre-labour.

The origin of the guess about the source of the transformation of result R_a into R_b through the mediation of an external instrument signified the origin of a *mediating representation*. This notion included the sensory image of the instrument on the one hand, as a 'copy' of an objectively existing object with a definite form, weight, hardness, etc. (e.g. a sharp stone), and on the other hand as an external object that could, under compulsion of the subject, contain an independent action inherent in it (e.g. infliction of a mortal wound).

The savage's notion of a dead instrument (tool) as an animate object did not, of course, correspond in any way to the truth. The sharp instrument concerned was not only not animate, and could not become so, but also did not augment the physical force applied to it by the savage. It only transformed that force, increasing the effectiveness of its application in proportion to the reduction in the area of thrust. Nevertheless there was an objectively true content in this notion, which consisted in reflection of the fact of a real transformation of force by means of an instrument. This second aspect of the mediating representation became a very primitive means of uniting in the savage's head the results of his action on the instrument and the results of the instrument's effect on an object of the environment.

The origin of the mediating representation, conditioned by the *objective* process of the transition to activity mediated by tools, meant that a new psychic faculty arose in the acting subject, namely a *subjective* capacity to create mediating representations. This representation thus emerged as one of an *objectively* existing intermediary that linked various sensually observed events into a whole through the *subjective* endowing of this mediator with real or imaginary properties of activity that went beyond direct sense perception.

This faculty can be called *imagination*. The 'original' faculty of imagination, which had its sources at the time of the rise of mediating representations, also became differentiated during the knowing subject's social and historical development in accordance with the role that it began to perform in acts of the creative thought process, and has been given various labels: productive imagination, intellectual intuition, fantasy, artistic invention, creative illumination, etc.

Since the development of a mediating representation meant the fixing of a connection between at least two different phenomena in primitive man's head, the connection fixed as a psychic phenomenon contained the possibility, in undeveloped, embryonic form, of the origin of the first cellule of logical thought, viz., the beginning of that 'schematism of our understanding', the secret of whose rise idealists declare to be inaccessible to scientific knowledge. It will be readily concluded from the foregoing that the beginning of the formation of rational reflection of reality was the fixing in the psyche of a connection that can be simplified as follows,

using our symbols:

'If R_a, then R_b (through mediator M)',

where R_a is the result of man's action on the tool, M the tool, and R_b the result of the tool's effect on the object of labour.[4] In our view this scheme can be regarded as the initial 'cellule' of logical thought.

The origin of the first idea through imaginary attribution of properties of inner activity to a tool should not, obviously, be interpreted as the appearance in primitive man's head of concepts of the type of 'this is a tree', 'kill a leopard', etc. If man's ancestor, whose head was first penetrated by a thought, already possessed a developed faculty of articulate speech, he would rather have fixed the birth of thought in a quite complex expression, like 'Just look at that! This object we have thrown has killed the leopard!' The primitive men being differentiated from the animal kingdom did not, of course, possess the faculty of expressing an idea in such complicated form. But it was not necessary, since the idea first arising, which contained our three-member relation in 'rolled-up' form, was still an inarticulate thing, and could therefore be expressed by using relatively simple gestures and sound signals of some sort to draw attention.

Just as with the living organism's direct connection with its environment, perception and sensation coincided at first, and only later were separate sensations and perceptions singled out from this unity so, with man's connection with the environment mediated by a tool, the first idea was something integrated and inarticulate. Only in the course of further evolution were separate concepts, judgments, and inferences singled out from this unity, and all the forms of thought arose, governed by certain rules. But in contrast to the source of the original integral unity of perception and sensation, which consisted in the wholeness of the living organism itself, the original integral character or wholeness of the idea ascended to the formation of a representation of a mediating producer external to the organism that linked the events into a certain unity.

The qualitative transition from the sensory to the rational level of reflection is thus associated with the origin of a mediating representation. But, before this representation could emerge as the mediating link between the sensory and the rational, the tool had emerged as a real and not an imaginary mediator between the organism and the environment.

During our subsequent exposition we shall have to return again to a more detailed examination of the interpretation of the qualitative change in direct sensory reflection caused by transference of primitive man's vital activity to the 'activity' of the tools he used, changes that transformed the whole sphere of sensibility, including instincts, emotions, perceptions, sense of needs, etc., over the course of a lengthy development. Here we would draw attention simply to the most common consequences of this 'transference' from the angle of the rise in primitive man's head of those 'universals' which, in contrast to 'sensa' (sense data), opened a door to the inaccessible world of the mental identification and differentiation of things and their properties and relations.

The transference of man's own life activity that differentiated him from the animal kingdom to the instrument of pre-labour he employed stemmed from the fact that his life activity was objectified in the instrument's action. But this objectivising meant that primitive man (in contrast to animals) got the opportunity to see his life activity as 'his other', embodied in the action of external objects. One may say that man's self-knowledge began with his recognition of himself in the patterns or regularities of the environment that he had discovered in the course of joint activity. Man's attitude to external nature began to be governed by the scheme 'subject—subjectified object—object'.

In the first mediating representation that reflected the transition to the use of tools, there was already the embryo of the universal, the general concept of the identity and difference of man and nature. The mediating representation that attributed a property of internal activity to objects, concealed behind their outward appearance, made it possible to establish a link '*I* and not-*I*' (though still in the naive form of attributing a spirit) as two sides possessing some quality in common (precisely a capacity for self-movement and active efforts according to certain rules), and so being, in that sense, identical. But the link thus established was at the same time one between two different aspects opposed to one another. Primitive man, being himself a natural force, was compelled to struggle against the forces of the environment, defending his 'right' to exist.

The transition to use of tools opened up quite new opportunities in that struggle, putting forces of nature at man's disposal that gave a significant 'increment' to his own forces.

It was that transition which led to the origin of man himself as a rational being. At the same time, however, a boundless prospect was opened up before primitive man's senses and thought, in contrast to animals' direct sense reflection of reality, of the action of such powerful, incomprehensible forces hidden behind the outward appearance of things, that his own forces seemed insignificant beside the natural forces opposing him. The low level of development of the productive forces in primitive society still made man almost wholly dependent on the elemental forces of nature.

Notes to Chapter 3

[1] See *Filosofskaya entsiklopediya*, Vol. 5 (Moscow, 1970), p. 18.

[2] The concept of object of labour is used here in the same sense as in political economy, with the reservation, however, that since man's indirect relation with nature is regarded from the most general aspect, there is no need to introduce the concept of raw material as that part of the object of labour which is an already partially processed object of virgin nature.

[3] The dependence between the physical quantity of the force acting (by pressure) perpendicularly to a unit of surface area and the area of that part of the surface on which it operates (the area of thrust) is expressed in simplified form by the formula $P = \frac{F}{S}$, where P is the pressure, F—its force, and S the area of thrust. It will be seen that the result of the effect of one and the same force may differ, depending on whether the area of thrust is larger or smaller.

[4] For simplicity of exposition we shall not introduce new designations to characterise ideal reflection of events in contrast to the events themselves as an objective given quantity, except to put the appropriate symbols in quotation marks when it is a matter precisely of the ideal reflection of the given events in men's heads.

4

Time and Space as Objective Entities

In the previous chapters we examined certain aspects of the qualitative, special features of psychic reflection of reality stemming from the qualitative difference between living organisms' two types of relation with their environment, designated respectively by the schemes $S \rightleftarrows N$ ('organism—nature') and $S \rightarrow M \rightarrow N$ ('subject—subjectified object—object'). We limited the description of their features then to very common elements, and adopted them in an abstract form precisely as generic relations of animal or man with the environment, leaving aside many of their other aspects. We abstracted, for instance, the very important circumstance that, in addition to relations with the environment, there are also relations between the individuals that make up a community designated by the symbol S. We shall go into the point of the methodological legitimacy of this abstracting later; here we would draw attention to another aspect of the approach we have adopted to analyse direct and indirect (mediated) relations.

We have also treated each of these types of relation abstractly, so far, in 'pure' form, in the sense that the description of animals' sensory reflection of reality was associated exclusively with the direct link between the organism and its environment, while man's rational reflection of it was associated with the link mediated by tools. That approach allowed us to oppose the one type of relation to the other with greater clarity, and to bring out most clearly the objective bases of the qualitative difference between the preconscious and conscious levels of reflection, and to concen-

trate attention on the most common pattern of the transition from the first to the second. In real life, however, such 'purity' of relations is far from always obvious.

Not all species of animal interact only directly with their environment; many have elements of an indirect, mediated relation to it through external objects of adaptation, or through living individuals similar to itself (or belonging to other species). When, for example, a squirrel in a dense forest hurriedly hides in its tree hollow, having heard the alarm calls of a magpie (though it itself has not seen the approaching hunter), this means that, whatever the preliminary conditions of the forming of this behaviour, the chattering magpie functions as a kind of mediator for the squirrel between it and an object of potential danger to its life.

On the other hand, men are not simply related indirectly to their environment. True, with the development of civilisation the middle link (subjectivised object) displays a tendency to all-embracing growth, but men continue to experience a need for direct communion with nature. They do not watch the setting sun or look at the starry heavens solely through telescopes. They prefer to breathe air without resorting to a gas-mask or an oxygen mask (though, incidentally, the air pollution in some big cities has reached such an alarming scale that it is no longer safe to breathe without the mediation of a respirator).

The mediated character of men's relations with the natural environment, and their everyday communion with the 'humanised' part of it rather than virgin nature, can and do create the illusion that they possess freedom in treatment of the natural medium and can dominate it without any need to act in accordance with the objective character of natural laws. Forgetting of the real connection between freedom and necessity expressed in the famous dialectical statement that 'freedom is understanding of necessity' can lead to catastrophic consequences in the realm of 'man—nature' relations. For men are a part of nature and not just her children. Children generally live longer than parents; people die, but nature is eternal. Nature can get along without people, but people never without nature.

Nevertheless, when we make the difference between living organisms' direct and indirect connections with their environment, and not their identity, the subject of our investigation, and take them in 'pure' form, it remains correct

that the first of these connections expresses essential features characteristic of the world of animals, and the second of the world of men, and that it is precisely the transition from direct connections to indirect ones that opens up the opportunity to pass to conscious reflection of reality.

Exceptions to the rules associated with abstract examination of the organism's direct and indirect relations with the environment, taken in their 'pure' form, cannot be interpreted in the sense that 'there are no rules without exceptions' or that 'exceptions simply prove the rule'. When it is a matter of knowledge of objective laws, the discovery of seemingly insignificant exceptions to a scientific law often not only does not confirm the law's truth but even leads to a crisis and disproof of a law developed earlier, and to its replacement by a new one that penetrates more deeply into the essence of the object studied. The observed deviations from the 'pure' schemes of living organisms' direct and indirect relations with their environment are obviously side effects of the general pattern of development of animate matter.

We assume that the operation of the objective laws that led to the creation of rational beings was not predestined, teleologically implying the only true line toward solution of this problem, i.e. the line that led to the origin of man. If we confine ourselves simply to the scale of our planet (and Earth is a 'speck of dust' in the infinite world of cosmic objects), then in earthly conditions there must, seemingly, have been many directions leading to the genesis of rational beings. It is another matter that they all, except one (which led to the emergence of *Homo sapiens*), proved to be 'blind alleys' in earlier or later stages of the branching of the tree of life. Some of the dead-end directions led to the origin of such complex forms of reflection of reality that it would have been impossible, without the singling out of an objective determinant for the rise of consciousness, to draw a distinct boundary between man's consciousness and the psyche of animals.

We shall not touch here on the early branchings of the tree of life that led to the formation of those stems that provided the basis for the evolution of plants and arthropods. We must, however, note in this connection that reports of the discovery, 'sensational' for their day, of a capacity in certain plants to perceive melodies created and performed by people are no longer taken as unauthoritative fantasies in

scientific circles. And there are no longer any doubts that individual species of insects, especially those leading a 'social' way of life (for example, ants and bees), possess an extremely complicated pattern of behaviour that includes a hierarchical division of functions in the activity of a given community as a whole between the individuals constituting it, and exchange of information between separate individuals of the community, in a special language.[1]

As before, we shall limit ourselves to examination simply of that stem of the tree of life that led to the formation and evolution of Chordata, and to the top of this branching where birds and mammals (including the primates and man himself) have their place, because this part comprises the species of animals most 'akin' morphologically to man.

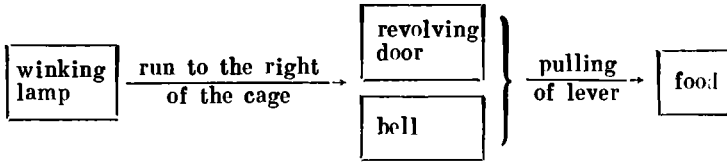
It has been discovered, moreover, that some of the side branches in the determined process of transition from the organism's direct relation with the environment to an indirect one appear to be exceptions throwing doubt on conclusions about the decisive role of this transition as the main cause of the origin of conceptual thought, or that call for extension of the status of rational beings not only to man but also to those species that clearly demonstrate a marked capacity for an indirect, mediated relation with the environment. In order to introduce clarity into this question (without rejecting the very general, abstract thesis about the origin of consciousness formulated earlier), we must obviously take the line of concretising it further. Above all, we must examine the 'operant' or 'instrumental' behaviour of certain animals.

In a Skinner box, in contrast to Pavlov's classic experiments, in which conditioned signals, preceding unconditioned-reflex reinforcement in time, occurred in the environment through the actions of the experimenter, quite independently of the actions of the experimental animal, the animal itself by its own actions evokes a result that leads to 'closing' of all the indirect links in the chain of actions that were terminated by an unconditioned-reflex reinforcement (e.g. by pressing a pedal, pulling a lever, etc.). That is all the more important because

> certain researchers consider ... conditioned motor reflexes to be a special form of behaviour, and give them a special name (operative behaviour, according to Skinner; conditioned reflexes of a second type, according to Konorsky and Miller; instrumental conditioned reflexes, according to Hilgard and Mar-

quis), suggesting that they differ in principle in their physiological mechanism from classical Pavlovian conditioned reflexes.[2]

Let us take as an example the chain of operative behaviour in laboratory conditions of an animal experiencing hunger[3]:



This chain is one of intermediate results and actions leading from a feeling of an unsatisfied need for food to its satisfaction.[4] In it the lever plays a role similar to that of the mediator-instrument, since it is only possible to attain the end result (food) by bringing an object (the lever) into play that is external in relation to the organism. The similarity, however, ends at that, and there is a fundamental difference between a tool and an external object (in this case a lever).

The lever was not invented by the animal; it is not even natural object that might be found ready-made in nature as an external object of adaptation; it has been deliberately 'rigged up' by man. The external object functions here as an obstacle to attainment of the end result, which is eliminated by the actions of the animal itself (pulling of a lever, stepping on a pedal, etc.). Many species exhibit a faculty for overcoming obstacles of this kind. A fox, for example, hunting for mice in winter, hearing a rustling under the snow, digs it away with quick movements of its paws in search of its prey. Here an obstacle is also eliminated by its actions, viz., the obstacle between it and the mouse (the layer of snow).

The radical difference between such a 'mediator' and the most primitive instrument of pre-labour is, other things apart, that the instrument is not an obstacle to attainment of the end result but on the contrary a means of overcoming an obstacle and, moreover, a means that becomes an artificial prolongation of the living organism's bodily organs. There are therefore hardly grounds for classing such operant conditioning as a principally different type of behaviour going beyond the context of classical conditioned reflexes,

although there is undoubtedly a much more complex mechanism here, in this case of the forming of the conditioned reflexes than in classical ones. It is also quite clear that there is a direct interaction of the animal and the environment here, because the mediator-objects that prevent attainment of the final result, and therefore call for elimination, are an integral part of the environment. The scheme $S \rightarrow M \rightarrow N$ (in our notation) does not exist here.

The transition from the organism's direct interaction with the environment to an indirect, mediated one, which led to the origin of the rational being, could seemingly have only happened when there were several conditions present in which the law of the struggle for existence operated. That law is the cause of the formation through natural selection of a host of animal species possessing various potentialities for further development of their bodily organisation, and at the same time for complication of the forms of reflecting the environment necessary for survival in a changing situation.

When the transition to use of instruments of pre-labour was completed, a most important condition for transference of man's ancestors' own actions to their 'self-motion' as to 'their other' representations of movement and changes in space and time as objective entities existing independently of them must have been formed in their psyches.

The rise of a guess in the brain of man's ancestors about the 'self-movement' of the external mediator-object bringing an addition to their physical efforts obviously could not have happened if a space-time determination of their own activity had not been transferred to the 'activity' of the mediator actuated in the course of their actions, and so perceivable as something which, while caused by these actions, was already separate from them.

Are animals capable of fixing events in a space-time sequence? If so, how is sensory reflection of movement in space and time differentiated from its logical, abstract reflection?

An affirmative answer to the first question follows from the existence of anticipatory reflection in highly organised animals. They not only quite accurately fix the distance separating them from an object interesting them, but also correlate the path of their own movement with the changing trajectories of the object's movement. A cat pursuing a mouse, for example, does not just run after its victim, repeat-

ing all the zigzags of its path, but cuts across it, i.e. extrapolates the mouse's future position. Numerous observations confirm that highly organised animals not only perceive events taking place in present time, but also somehow experience future events. A hunting dog begins, by all its behaviour and appearance, to hasten its master to a fascinating future walk in the forest as soon as the first preparations for a prospective hunt are begun.

But, however complicated animals' predictive behaviour may be, the general principle still stands that, with a direct relation between the living organism and the environment, the space-time sequence of the results of its activity is united into a whole of some kind through the living organism's inner active unity itself. Space-time changes in the environment are fixed in the animal psyche as inwardly experienced factors not separate from its own actions. For space and time to get a subjective reflection in the animal's psyche as objective facts, it is seemingly necessary that the space-time factors become objectified and transformed into facts external to it, but this transformation, which is achieved on the one hand by the animal's own actions, is no longer, on the other hand, reducible to them.

Allowing for that, we can presume that representations of movement in space as an objective reality independent of the living organism's actions could not have been formed earlier than the stage of evolution when spatial displacement of the mediator-instrument was obviously separate from the organism's bodily functions.

An ape's dislodging of an object at a distance from it by means of a stick (even prepared by the ape itself by biting off surplus twigs from the branch of a tree), for example, only creates the prerequisites for forming a representation of space as an objective fact, but still does not lead to it. The stick extends the natural length of the ape's arm, as it were, and serves as an external material standard of length or stretch. The stretch of the ape's own body is thus translated into the length of the stick extending it. But the 'independent' spatial displacement of the stick, separate from the ape's organism, becomes obvious when the ape throws the stick at a remote object in order to dislodge it, and the throw leads to the desired result. The example of the 'aimed throw' is good illustrative material, in our view, for explaining one of the conditions for the transition from sensory reflection of space to its conceptual reflection.

The act of an aimed throw contains moments of the interruption of continuity that are reflected on the level of direct observation, on the one hand, as the result of the organism's own actions (the throwing of an object) and, on the other hand, as the result of the action of an external mediator-object separate from the organism (dislodging of the target object by the thrown object). Such a throw leads to the organism's reflection of the distance between its own body and the target object in the form of a distance that is overcome not by spatial dislodgment of the organism itself but by dislodging object *M* external to it, and put into action through the organism's own actions.

Recognition of the capacity to make an aimed throw of an external object as one (but not the sole) condition of the transition to logical thought, and precisely as a condition for the forming of representations of space as a distance existing independently of the subject, i.e. space as an objective entity, enables us to pass the frontier between animals' perception of space and man's perception of it. The subjective reflection of spatial intervals through an aimed throw differs qualitatively from the direct perception of space characteristic of the organism's direct connection with the environment. If, for example, a predator controls the direction of its actions by extrapolating the trajectory of its future victim's movement, the primitive hunter must already have foreseen not simply the path of the object of his hunt but also the path of the weapon thrown by him. In works on cybernetics this difference is sometimes designated as the difference between predictive behaviour of the first and second order.

The passage to aimed throwing of objects of external adaptation as a condition for the forming of representation of the objectivity of space brings out an essential difference between men's use of tools and the use of external objects by certain species of animal in a manner similar to men's implement activity.

We can now consider refuted the old view of primates' (e.g. chimpanzee's) incapacity to make and use external objects of adaptation in natural conditions, outside situations intentionally 'provoked' by man in experiments with apes. Bernhard Grzimek, an eminent authority on animals provides evidence that chimpanzees are capable of making weapons for themselves; having broken off a branch, they bite off the leaves and thrash an enemy with this club.

But they do not know how to aim, so they seldom throw anything.[5]

The results of the observations of the life of chimpanzees in natural conditions made by Jane van Lawick-Goodall are well known. She was able to gain the confidence of these anthropoid creatures and lived alongside them for many years.[6] Studies of the behaviour of chimpanzees have shown that they resort to use of external objects, for example to get honey from bees' nests or to extract termites from their nests. In the latter case the weapons of the 'hunt' are simple stems of plants or branches stripped of their leaves. The chimpanzees push the switch into the termitary, and then draw it out, licking off the insects covering the twig. They may spend whole hours doing this. If the end of the 'fishing-rod' bends and will not go into the hole, they break it off and again push it into the termites' nest (licking it as well, so that the insects stick to it better!) Sometimes such previously prepared twigs are laid on top the nearest termitary. When the 'fishing-rods' become quite useless, the chimpanzees change them for newly prepared ones. Cases have also been described when they got water out from narrow crevices by thrusting a bunch of plants into them and sucking the moisture saturating them.[7]

Not only do higher mammals display a faculty for 'inventing' and using external objects as a tool or weapon, but so also do individual species of birds. On the Galapagos Islands there are small birds, woodpecker finches, whose actions in using external 'tools' have become a subject of close study in recent years. Here is what Igor Akimushkin writes about their unusual capacities:

> We saw them first in a film shot in the Islands by a group of cameramen led by the famous German zoologist Irenäus Eible-Eibesfeldt. We saw how, having pecked the trunk of a tree with its bill and attentively listened, the woodpecker knew whether there were beetle larvae under the bark and in the wood worth its attention. And how, later, when the larvae gave themselves away by panicky fuss, it stripped off the bark, often using a small stick as a lever, found the track of the woodborer, and then—something unbelievable happened! The woodpecker broke off a spine from a cactus with its bill, and taking it in its bill thrust it into the opening left in the tree by the larva. It twirled the spine vigorously in it, trying to pin the 'worm' or to force it out of the labyrinth of passages in the inner bark and wood. Its inventiveness is often rewarded immediately, but sometimes it has to mess about for some time before the fat stupid grub quits its woody chambers, seeking

> safety from the outrageous spine in reckless flight. Then the woodpecker, either sticking the spine into the tree or holding it in its claw, seizes the grub. If no spine is available the bird breaks off a small branch with its beak and snaps twigs off it, which it breaks down so that it will be convenient to work with.[8]

The same 'cunning' means of gaining its subsistence are also employed by the related species of mangrove finches.

Such complicated behaviour when the animal itself sets in train by its own actions external objects of adaptation into order to attain vitally important results, performing for that preliminary operations to make said objects, differs markedly from simpler conditioned-reflex activity. The external object partially worked up by the animal and used by it as a tool or instrument, already serves as an artificial prolongation of its bodily organs. But it is not yet separated from its bodily functions, such as occurs in throwing at a target. Therefore a representation of the objectivity of space cannot be formed in the brain of the animal performing such actions.

That does not mean, however, that the developing tree of life could not have arrived in some of its branching (not counting that of *Homo sapiens*) at the formation of species that had come to acts of aimed throwing and even mastered them. The following example from the behaviour of forest chimpanzees presents interest. When encountering a stuffed leopard they break branches off from trees and brandish them threateningly. Some of the apes throw branches, sticks, and stems at the leopard, but without taking careful aim so that only some of the objects hit the supposed enemy. Jane van Lawick-Goodall and her colleagues often observed how chimpanzees threw hefty stones at an enemy. And although these throws were awkward and the stones did not hit the target, there was no doubt that they were thrown at a definite target. Such throws are only a step away from successful aimed throwing, but a step that is of fundamental importance for forming representations of the objectivity of spatial extension. The puzzling capacity of dolphins for taking precise aim, which they demonstrate after training when playing 'basketball', throwing a ball into a basket hanging above the water, seems even more surprising.

The capacity to throw formed in certain species of birds is no less puzzling. It was noted back in antiquity (as has been confirmed by present-day investigators) that there are

birds that crack the shells of nuts, tortoises, and molluscs that do not yield to blows of their beaks by a very 'cunning' method: they soar upward with their prey, and then drop it from a height onto rocks or other hard ground.[9] Such complicated behaviour still cannot be classed as aimed throwing in the full sense. It may be due to a conditioned-reflex chain of the closing of a temporal link arising as the result of accidental falling of a caught victim and its subsequent reinforcement by food in the bird, descending to its dropped prey. But how are we to explain the descriptions in the literature of the actions of the Australian crested hawk, which bombards emu eggs from the air? We must also cite the following picture of the behaviour of the African vulture (one variant of which has been shot on film):

> When a bush fire drove ostriches from their nests, their eggs were not damaged. White-headed and lappeted vultures tried to break them with strong blows of their beaks, but without success. Then two carrion vultures flew up. At first they tried breaking the shells of the eggs with their beaks, but when that failed they sought out stones weighing 100 to 300 grammes. They picked these up in their bills, then standing erect and raising their heads high with the stones in the beaks, they threw them down straight onto the eggs lying at their feet. After from four to twelve blows the shell was cracked and the feast began.[10]

This clearly expressed African carrion vulture's capacity for a mediated action, which almost completely coincides in its main objective consequences with the mechanism considered earlier of man's ancestors' use of primitive instruments of pre-labour, still awaits scientific explanation. The stones that play the role of mediator between the organism and the environment add something 'extra' to the bird's direct physical efforts, because it could not break the hard shell of the ostrich egg by its beak alone. There is also here an act of an aimed blow that creates the possibility of perception of spatial extension 'isolated' from the direct spatial displacement of the body of the bird itself. It may be supposed that birds' mode of life (like that of dolphins), freely moving in any of the three dimensions of space in spite of the effect of gravity, led to the rise in some species (with a sufficiently developed neurophysiological organisation) of conditions for the formation of quicker reactions of 'objectifying' space through sporadic use of external mediators in such a specific way.

But even if it has been established that certain species have the faculty of forming representations of the objec-

tivity of spatial extension, it is still impossible to conclude from that that they could 'guess' the self-movement of the external mediator as the source of the 'increment' that increased their own strength.

A necessary condition for making such a guess was also the forming of representations of changes in time as an objective entity existing independently of the reflecting subject. Although notions of space and time are often closely linked with one another, there is nevertheless an essential difference between them. Transference of the subjective perception of time to an external object as to 'its other' is associated with more substantial difficulties and is a much more complicated process than transference of the perception of space.

When Kant linked the representation of space with an external intuition and that of time with an inner sense, he was noting an important difference in the subjective perception of space and time (in spite of the error of his subjective idealist approach to their interpretation). Spatial extension is, in fact, perceived by exteroreceptors (organs of vision, hearing, smell, etc.) as something externally opposed to the perceiving organism, as for example the definite size of the external object, or its remoteness at some distance, or the direction in which it lies in relation to the subject of the perception, etc. But can one see, hear, or smell time as an external object? The answer to that is not so obvious. When we cast a glance at the clock in order to know what time it is, we do not see time, but rather the location of the hands on the clock-face. We can see the movement of the second hand and hear the ticking of the clockwork, assuring ourselves that our clock has not stopped. The clock was invented at a comparatively late stage in the development of society; and for its invention to be possible there had to be an understanding that time passed independently of whether we slept or were awake, or whether we waited impatiently for a desired meeting, when every minute seemed to drag on interminably, or whether we discovered (on the contrary), carried away by an enthralling play or interesting talk, that it was already past midnight.

Animals cannot objectify the passage of time by an object made by them, similar to clockwork, but they can orientate themselves in time. With a direct link between the organism and the environment, a sequence of the results of actions following one another in time is associated in the animal's

psyche in a certain whole through its projection onto the background of the instinctive sense of self-preservation. The objective length of time is perceived by animals as an inner, emotionally experienced expectation of the happening of a vitally important event (e.g. the receiving of food) after an indifferent stimulus preceding it in time (a conditioned signal), if this signal has already led in the past, after a certain period of waiting, to the emergence of just that event.

The exceptional importance of animals' capacity inwardly, 'subjectively', to experience the sequence of phenomena recurring in time has been confirmed experimentally by the fact that the closing of a temporal link underlies the physiological mechanism of the forming of a conditioned reflex in an animal, i.e. of 'this central physiological phenomenon of higher nervous activity'.[11] With the discovery of biological clocks, as we have already noted, it was also established that animals have an inner sense of time and a capacity to measure its daily intervals, and to maintain the periodic rhythm of processes taking place in their organism.[12]

One can admit the truth of the Kantian thesis of a link between representations of time and an inner sense rather than an external intuition if we limit the organism's interaction with its environment simply to the dyad 'subject—object'. The ordered duration of time would really be experienced in that case as the product of subjective activity, and we would be forced to agree with Kant's categorical conclusion that time 'in itself, independently of the mind or subject, is nothing',[13] with the reservation, however, that it would be such only from the standpoint of the subject, and an animal-subject rather than a human one. At the same time, however, we would have to reduce human consciousness to the animals' sensory reflection of the external world, and to regard consciousness as exclusively 'animal consciousness', which clearly contradicts reality.

Kant did not avoid dualism, either, in his analysis of the perception of time. Although he understood time as 'nothing else than the form of the internal sense',[14] he linked its representation with intuition of the mutability of external things as well, and compared the sense image of time with an image of drawing a line, i.e. with an image of the process of drawing a line and not of the actually 'drawn' line, because in the latter case the line represents

an image of spatial extension rather than a period of time.[15] If we take any point on the surface of the globe as the starting point for reckoning the spatial displacement of a body, then its trajectory will be the line of its change of position in relation to the initial point of reference outside it. This change takes place in time, but the representation of time cannot be reduced simply to one of the duration of a body's mechanical displacement in space. If the body in our example remained in a state of rest at a given point in relation to that point, time would not cease.

Therefore, if we tried to treat time as a special form of the existence of matter, differing from space (although inseparable from it), its duration would have to be represented not by the image of drawing a line but rather by the image of a continuing process, of a point moving in a line as a point of the relation, at least, of two objects, or of the inner change of a single object, taken separately, containing a unity of opposing aspects. In that case the image of the dialectical self-movement of matter in time, including both spatial displacement of bodies and the process of change and development of material systems taking place due to inner causes, would correspond more adequately to the image of the duration of time.

Time (in any case at the level of a macrosystem) has its own order or sequence as well as duration. It is one-dimensional and irreversible, flowing from the past through the present to the future. The duration of processes in time may be characterised, moreover, by the different speeds or rates. That makes the problem of transferring the internal sense of time into its perception as an objective fact even more complicated. If the outward, material standard of the extension of space can already be a stick in an ape's paws, what process or object can take on the role of external standard of the ordered duration of the passage of time? Abstracting from the subject of perception, we might say that the periodicity of processes occurring in nature (e.g. the Earth's daily rotation around its axis, or its annual revolution around the Sun) could be taken as the objective (though not absolute) standard of time. The period of relative rotation of the process in regard to its previous result can be taken here as the interval of the measurement of time.

Many animals possess an amazingly developed sense of orientation relative to the daily displacement of the Sun. But, given the organism's direct connection with its en-

vironment, the succession of day and night, position of the Sun in the sky, etc., can only be perceived as signal-results in a general chain of recurring intermediate results and actions leading to satisfaction of biological needs. Here precise 'closing' of the cycle of recurring results is an unconditioned-reflex reinforcement (e.g. satisfaction of the need for warmth, the finding of food with the onset of darkness by animals leading a nocturnal mode of life, etc.), and not because of the Sun's return to its previous position a day later. An animal's biological clock, allowing for repetition of an earlier sequence of events, enables it to determine more or less accurately the length of the time interval between intermediate signals and the satisfaction of biological needs.

But, since it is the objective recurrence of phenomena in the outer world that underlies the forming of animals' anticipatory reflection of that world, the sensually perceived standard of time must, apparently, be taken as the period of the living organism's 'return', as it were, to its previous state, associated with the objective recurrence of objective phenomena, that is to say, the period in which the feeling of a situation satisfactory for the maintenance of life is succeeded by an unsatisfactory one, there is a new return to the feeling of a satisfactory situation, etc.

For such an inner sense of time to be transferable to external objects as 'its other', the animal itself has, through its own actions, to carry on an interaction of external objects occurring outside it and possessing a property of duration in time and of the periodicity of a cycle that would lead to recurring external results of vital importance to it. In other words, the point of the 'closing' of the cycle of phenomena must be transferred from the inner plane (sense of satisfaction of a direct biological need) to an external one, to external objects.

It is quite clear that neither the Sun nor Earth could become such objects, because not even man, let alone animals, is capable of imparting action to them or even of altering Earth's revolution around the Sun or its rotation around its own axis. The transition from a direct to an indirect interaction with the environment creates the premises for the possibility of sensory transference of the point of 'closure' of a periodically recurring chain of results to an external object. This object can only be an external mediator. To convert this possibility into reality, however, called

for further development of the tool activity of man's ancestors, dictated of necessity by the objective conditions of the struggle for existence. We shall examine the separate stages of the objective logic of this development later; here we would just note that it (this development) quite naturally led to the production of tools by means of tools.

The protracted act of the 'generation' of a tool by another tool similar to it also meant the development of a new cycle of results 'closed' on an external object, i.e. one put into motion by man's actions but at the same time reproducing itself as an external object that is a means of satisfying vital needs, albeit, of necessity, indirectly and not directly. The length of the process of the tool's affecting the object of labour, which led to the appearance of a new tool, became accessible for subjective perception as something 'own', because the process was the result of the subject's action; at the same time, however, it was 'its other', because it took place relatively independently of the subject as a process of an interaction of tool and object of labour external to him, and led to a result that, while important for the subject, was separated in time from satisfaction of the organism's biological need (because the new tool still had to perform its role of tool in the subject's subsequent activity). The objective precondition was thus created for perception of the ordered duration of time as the length of processes taking place outside the subject, and as the separation of the datum point of time from rigorous connection with the internal sense of emotionally experienced expectation of a satisfied, directly biological need. But that was only the first step on the long social, historical road to understanding time as an objective form of the existence of matter.

There is hardly any need for such a detailed substantiation of the thesis that the forming of representations of space and time as objective facts did not (and could not) mean the development of some conceptual (let alone philosophical or scientific) determination by man's ancestors of space and time as a preliminary condition for the passage to logical thought. It was a matter only of the development of their instrumental (tool) activity leading to the rise of a reflection of reality, in which the extension and duration of phenomena of the external world began to be perceived as something that existed and 'acted' relatively independently of the subjective acts and experiences of the ancestors

themselves, leading to certain results (desirable or undesirable).[16]

We concluded earlier that the initial 'cellule' of rational reflection of reality was the fixing in the psyche of man's ancestors of the relationship: 'if R_a, then R_b (through mediator M)'. We can now concretise that by pointing out that the guess about a tool's 'self-action' as the source of the 'increment' contained in R_b (the result of the tool's action on the object of labour) compared with R_a (the result of man's effect on the tool), could seemingly not have arisen before the stage of the development of the use of tools, when the transition was made in practice to the *production* of tools *by means of* tools. The sensually observed fact of the birth of a new tool from a tool in the act of the latter's interaction with an external object of labour led to the mediator-tool's coming to be regarded as an inspired body, while the 'addition' to man's own forces obtained through using tools began to be perceived as the consequence of an inner cause latent in them, i.e. of their 'vital activity'.

In the transition from direct to indirect (mediated) influence on the environment there was thus already the premise for the possibility of the logical scheme 'if R_a, then R_b (through mediator M)' to arise, but the possibility was only converted into reality at a definite, later stage in the development of mediated activity. That is a manifestation of the law of the dependence of consciousness on the level of development of practical, material activity, the lag of consciousness behind being, in spite of the possibility of anticipatory reflection of reality. Such reflection became possible in consciousness just because consciousness had an objective content, and only insofar as this reflection of objective patterns was an adequate of these patterns themselves existing outside consciousness. The dialectical materialist thesis about the secondary nature of consciousness also extends to the initial period of the rise and establishment of consciousness as a special, ideal form of reflection of reality.

Consciousness could not have arisen if the natural process of the transformation of apes into men had not led to changes in the material neurophysiological substratum of the psychic activity of man's ancestors, to a transformation of the ape brain into the human brain. In that connection we may suppose that direct sense perception must have

required the existence of some circular, closed/open cerebral process as a condition of its existence, the beginning and end of which process were merged in a unity of opposites experienced in the form of satisfied and unsatisfied biological needs passing into one another. The transition to logical thought must therefore have been accompanied, along with preservation of the former circuit, with the rise of a new neurophysiological circuit connected with it, the starting and final points of whose pulsations had become the material, cerebral substratum in man's ancestors' reflection of the fact of their reproduction of external mediators by means of external mediators.

On the other hand, to the extent that we recognise the fact of the rise of new, open/closed loops in the organism's neurophysiological structure, we would have to conclude that this new link was some new, inner entity by virtue of its relative closure, or a system possessing the property of self-development during interaction with the environment. In other words, the genesis of such a connection (at the bioelectric level, for example) must have been, in turn, an inner stimulus for further development of the brain matter and of the whole living organism as an integral system.

Notes to Chapter 4

[1] No few works have been published in recent decades on problems of animal behaviour (ethology), including the behaviour of 'social' insects and their 'language'. We would single out, in particular, the book of the French biologist Prof. Rèmy Chauvin *Les sociétées animales* (Plon, Paris, 1963). Without going into a discussion of the methodological principles that guided him, we must note that his book contains many facts about animals' very complicated forms of behaviour, including Karl von Frisch's discovery of the phenomenon of the dances of bees as a means of exchanging information between the individuals of a hive. See also Karl von Frisch. *Bees: Their Vision, Chemical Senses, and Language* (OUP, London, 1950).

[2] A. S. Dmitriev. *Fiziologiya vysshei nervnoi deyatel'nosti* (The Physiology of Higher Nervous Activity), Vysshaya Shkola, Moscow, 1974, p. 190.

[3] See A. V. Napalkov and N. V. Tselkova. *Informatsionnye protsessy v zhivykh organismakh* (Information Processes in Living Organisms), Vysshaya Shkola, Moscow, 1974, p. 201.

[4] The full 'closed' cycle of this chain can be written more fully, employing the symbols we have adopted (see pp. 56-57) as follows

$$\left|\overline{r_h}\right| - \left|\overline{r_{\bar{h}}}\right| \xrightarrow{1} \left(r_1 \xrightarrow{2} \left.\begin{matrix} r_3 \\ r_2 \end{matrix}\right\} \xrightarrow{3} r_4 \right) \xrightarrow{4} \left|\overline{r_h}\right|$$

With this notation the intermediate character of the results within the brackets is obvious.

[5] See Bernhard Grzimek. *Sredi zhivotnykh Afriki* (translated by E. Geevsky from *Grzimek unter Afrikas Tieren* [Berlin, 1969]), Mysl, Moscow, 1973, p. 32.

[6] See Jane van Lawick-Goodall. *In the Shadow of Man* (Houghton Mufflin Co., Boston, Mass., 1971).

[7] *Ibid.*, pp. 35-37, 98-99, 184.

[8] See I. Akimushkin. *Mir zhivotnykh (rasskazy o ptitsakh)* (The World of Animals. Stories about Birds), Molodaya Gvardiya, Moscow, 1973, p. 370. We cannot, of course, attach the significance of scientific terminology to the metaphores used by Akimushkin, or attribute human capabilities and characters to animals, as he does in this passage, but the facts observed of the birds' use of external 'tools' cannot help evoking a need for a scientific explanation of them.

[9] In the journal *Nauka i zhizn'* (1968, 1:60), for example, G. Simakov reported the following: 'Workers at Tashkent airport long ago noted that in the autumn the landing strip was littered every day, for some reason, with walnut shells. Who could be causing this disgraceful state of affairs? Passengers did not walk on the landing strip. It turned out that crows were guilty. Gathering nuts from trees and picking up windfalls from the ground, they flew to the airport with them and dropped them onto the concrete runway from a height of 30 to 50 metres. The nuts broke and the crows feasted. If a nut did not break the bird picked it up and dropped it again. It is interesting that it was not just one bird that was so quick-witted; dozens of crows circled above the airport.'

[10] See Akimushkin. *Op. cit.* (1973), p. 148.

[11] See A. S. Dmitriev. *Op. cit.*, p. 93.

[12] See V. B. Chernyshov. The Accuracy of Biological Clocks. *Priroda*, 1974, 12:87.

[13] Immanuel Kant. *Critique of Pure Reason*. Translated by J.M.D. Meiklejohn (J.M.Dent & Sons, London, 1934), p. 50.

[14] *Ibid.*, p. 49.

[15] When characterising internal sense, Kant pointed out the importance of the act of attention as an example of the subject's effect on his internal sense, and remarked that 'we are necessitated to take our determinations of periods of time, or of points of time, for all our internal perceptions from the changes which we perceive in outward things' (*ibid.* pp. 106-107). 'We cannot represent time, which is not an object of external intuition, in any other way than under the image of a line, which we draw in thought' (p. 106).

[16] The formation of notions of time as a fact existing outside man took the form among the ancients of its personification in the image of an exalted being (which was a characteristic in general of primitive thought). In Greek mythology, for instance, time was represented in the image of Kronos, who was one of the sources of the world. Kronos generated fire, air, and water, which in turn provided the beginning of several generations of gods. The Roman god of time, Saturn, was also the god of crops, i.e. his activity was already regarded through the prism of changes of the annual periodicity of men's labours. At the same time the name 'Saturn' was associated with the past 'golden age', in memory of which annual festivals (Saturnalia) were observed.

5

The Sensory World in the Light of Ascending Reason

The qualitative leap from sensory reflection to conceptual thought must have contained a whole number of intermediate transitions both before the first glimmer of thought and after it. Each of the links in their successive chain could have been separated from one another by tens and hundreds of thousands of years during the historical evolution of hominids; nevertheless there was a causal link between them stemming from the development of mediated (indirect) sense activity, and receiving its explanation from practice.

Along with the development of primitive man's labour activity with tools, and the complication of thought operations, all aspects of direct sensory reflection were qualitatively altered.

The instinct of self-preservation, as an expression of the living organism's striving for maximum negative entropy in its direct interaction with the environment, had been realised through the organism's own activity. Now, however, with the transition to a mediated interaction, it was realised in addition through the action of a mediator-tool. Man's ancestors' increasingly harder struggle for existence caused a transition from sporadic to regular use of instruments.

Self-preservation of the living organism now appeared as its preservation by means of external instruments, which called for preservation of the latter. Man's ancestors passed to guarding objects of external adaptation, which they used as mediators. As regular use of instruments was transformed into a vital necessity, the loss of a tool, whatever

the cause (physical wear, loss, etc.), would evoke a striving to recover the old one, or get another like it, which, in turn, would have led to a search for tools among objects in the surrounding set-up, or to making one from external objects by their own efforts.

Should we not also assume that man's ancestors passed (after daily practical use, for example, of stones had become a *fait accompli*) to breaking natural stones they picked up by throwing them onto the floor or against the wall of a cave, in order to obtain a stone suitable for use as a tool? This last suggestion is the more justified since it was more probable that striking one stone by another held in the hand might have caused less painful negative sensations than throwing it.

Against that interpretation of the transitional stage to the making of tools by means of tools, it can be objected that the moment so important for the moulding of man was in that case due to pure chance, while our task is to demonstrate the determined character of the transition as one stemming of necessity from existing circumstances. It can readily be noted that this argument has no basis. Of course, when a chimpanzee throws a heavy stone at an enemy, the fact that it is a stone and not another object that is to hand at the appropriate moment may be a matter of chance, but a chimpanzee's attempts to use external objects of adaptation as a weapon are not so fortuitous, since they are caused by a need to fight to preserve its life. The transition to use and hoarding of tools to maintain life occurs of the same necessity. Once man's ancestors had already mastered the operation of aimed throwing at a certain stage as a regular condition of successful achievement of vital results (e.g. the hitting of an enemy or prey) and had got a reflection in their heads of the need to have a suitable object 'to hand', e.g. a stone, in order to achieve that result, the transition to making suitable stones by breaking others on a hard stone wall would hardly have happened by pure chance.

The chance here is that some of man's ancestors might not have thrown a stone at the object of the hunt but at a stone wall and unexpectedly obtained other stones, suiting for hunting. But the forming of a capacity to throw and (the main point) the need to have a suitable stone as an integral requisite of successful actions in the struggle for existence, were not accidental. Without such prerequisites, arising of necessity, the results of striking one stone by

another leading, by virtue of objective causes, to the splitting (chipping) of even one of them would not have been fixed in the brain of man's ancestors as a vitally necessary result. Many modern discoveries are also regarded as pure chance when the most important circumstance is abstracted from them, namely that they were prepared by the whole course of the preceding development of man's practical and cognitive activity and could resolve problems meriting scientific or practical interest.

Reflection in the heads of man's ancestors of the special role of external mediators in their struggle for existence led to their beginning gradually to pass directly to the fashioning of these mediators, while the end result of life activity (satisfaction of biological needs) 'persists in the head' as the expected result of future actions by means of a prepared tool. That would have created an important precondition for practical activity becoming purposeful labour activity, when the end result was already in the head as the goal even before its performance, and the tool or weapon functioned as the means for achieving that goal.

There has been a lively discussion of the category 'goal' in the Soviet philosophical literature.[1] Following traditions formed in the past, materialists took the view that one could only speak of a goal in relation to man's cognitive activity. That point of view was opposed to teleological idealism, which started from the assumption that not only man but all nature contained a given goal. In present-day materialist science a tendency has developed, however, to objectify the category 'goal', extending it to explanation of all processes of self-regulation, including the realm of preconscious life and of the automatic control systems created by man. The goal is defined as 'the forming at the level of the nervous system of models of all the attributes and properties of a future useful result in connection with which, and for the sake of which, processes of afferent synthesis have been evolved',[2] as 'a model of the needed future coded in the brain' (N. A. Bernstein)[3] as 'the concentrated expression of the needs of a system during its self-regulation',[4] and so on.

It must be stressed that this tendency toward an extended interpretation of 'goal' is not shared by all materialist philosophers. The matter remains an open question, and a satisfactory solution calls for further research. But we have to note that, if we understand by goal the anticipation

of a future result proper to a material, self-regulating system, then attempts to objectify the concept can hardly be interpreted as a concession to idealist teleology. In the organism's direct interaction with the environment a cyclically repeated link in the chain of its actions already leads to its 'foreseeing' the occurrence of the end result, as it were, when it has fixed the initial result, by-passing the intermediate links of the chain. But such a linking of the results of its actions differs qualitatively from the linking of the result of man's effect on a tool with the results of the tool's effect on the object of labour. In the first case the means of attaining the end result is simply the organism's own actions. In the second case it is not only the organism's actions but also the 'action' of the mediator employed by it. In that case, too, the prevision of the future end result is therefore also qualitatively different.

This distinction is so essential that we would be quite justified in taking it into account, as well, on the plane of terminology. Because the term 'goal' has traditionally meant, in materialist philosophy, not just any prevision of a future result, but only conscious prevision, it should be left its former meaning, in our view, and an appropriate term found to designate 'anticipations of the future result' in other specific senses. It is important that the still existing terminological vagueness should not lead to confusion of concepts.

The complication of the activity of man's ancestors in the use of objects and forces of nature caused by vital necessity led to a complicating and differentiation of the reflecting operations whose initial form was the scheme 'if R_a, then R_b (through mediator M)'. So, for example, the throwing of a stone against the wall of a cave leading to the obtaining of sharp stones that could be used as new weapons in hunting, gave rise to the possibility of further development and complication of the structure of this scheme, without breach of its inherent wholeness and integrity. We might depict this newly arising possibility of mental reflection by a given chain of actions and operations as follows:

$$\text{If } S \rightarrow M, \text{ then } M^1 \text{ (through mediator } M \rightarrow N),$$

where M^1 signified the new tool obtained as a result.

The 'fabrication' of tools by such means, we would note, could have played a role only as a transitional stage to the

production of tools by means of tools. The act of a tool's interaction with an object of labour ($M \rightarrow N$), leading to the obtaining of a new tool (M^1) takes place here as the instantaneous act of striking, i.e. as an instant that might not yet be perceived as a process taking time. The external object N (object of labour) would also not be quite distinctly incorporated as a mediator in relation to tool M, remaining in many respects simply the object onto which the action of tool M was directed. But this transitional stage, as soon as it was fully realised, opened the road to new transitions in complicating the operations to make tools. When the fact that the interaction $M \rightarrow N$ led to obtaining another vitally necessary mediator M^1 had become reflected in the psyche of man's ancestors, it became possible to pass to working the external mediator by means of another external object, initially the use of an object of labour as a support-object and later as a means of mutual working of one external mediator by another.

At the same time reflection of the relation

'If $S \rightarrow M$, then M^1 (through mediator $M \rightarrow N$)'

would have been developed further; 'if $S \rightarrow M$, then M^1 (through mediator $M \rightleftarrows N$)', 'if $S \rightarrow M$, then M^2 (through mediator $M \rightleftarrows M^1$); and so on. A representation would consequently have arisen of the birth of a new tool as the result of the interaction of two external mediators, i.e. of the 'self-generation' of tools by one another. The original scheme 'if R_a, then R_b (through mediator M)', would then have been filled with a new content. An important step toward the production of tools by means of others would thus have gone hand in hand with gradual development of psychic reflection toward the rise of logical thought.

Since the mediator role of a tool was now performed not just by some external object taken separately, but through the mutual working of two or more external objects, the mediating representation would become one of a *process* taking place between external objects.

The rise of primitive man's notions that the process of the effect of external objects on one another, brought into being by his own actions, could lead to results useful to him, viz., the birth of a new mediator, would have been, in turn, a step toward his mastering not only of objects but also of forces of nature, and of objective processes like combustion taking place in it. Primitive man's master-

ing of fire would have been impossible if he had not already learned to use an object of the environment as mediator between himself and the environment and if the fact that it was possible to obtain useful results during the contact interaction of objects of the environment had not been reflected in his consciousness. Once these conditions already existed, the savage could use any stick he picked up for contact-interaction with a tree (burning, for example, after being struck by lightning) to carry fire on the end of the stick, without risk of being burned (i.e. suffering the negative emotion of a burn).

The transition to primitive man's use of fire objectively meant that he could put to his use energy resources of the environment that went beyond the possibilities of his own physical energy. The 'increment' to his own efforts from the use of a sharp object as a hunting weapon, while palpable, was objectively a fact of the transformation of the force exerted on it by the savage himself, and did not bring about any increase, in essence, in his forces. But the use of combustion as a mediator gave a real addition to man's own forces, an increment without quotation marks.

With the practical mastering of fire as a new mediator between man and his environment there arose a possibility of new mental operations in the form of the already known logical scheme: 'if cold, then warm (through a burning tree)'; 'if dark, then light (through a burning tree)', and so on. The burning tree was thus endowed, in primitive man's head, with the property of an inner activity and a capacity to produce light, heat, etc. With regular use of fire by keeping it going, he could have noted that dry sticks ignited faster and gave a brighter blaze than damp rotten wood. Given that man had already endowed wooden objects with a capacity to 'contain' fire, and had learned to subject external objects to mutual treatment so as to obtain useful results, there opened up the possibility for a new discovery most important in the history of primitive society; namely, to get fire by the friction of dry sticks on one another.

The transition to production of ever newer external mediators by means of external mediators meant a practical extension of man's power over the forces of nature opposing him, and led at the same time to a further development of human reason proper, which displayed not only its power but also its 'ingenuity', which, in Hegel's definition quoted above, consisted in reason's forcing external objects to

influence one another according to their own nature so as to achieve a set goal or aim without, at the same time, interfering directly in the process. And because the role of mediator M in the general interaction $S \rightarrow M \rightarrow N$ now no longer involved just one external object or force but two or more, acting on one another, we can depict the multiplicity of elements entering the structure of such a complex mediator (for example, a lathe and all its parts) as follows: $M : (m_1, m_2, \ldots, m_n)$. It is important, moreover, to add that, however complex and multi-stage the system M is in the total interaction $S \rightarrow M \rightarrow N$, it is not thought that directly serves as the factor creating and putting it into operation, but man's practical, labour activity. That is true as concerns both the savage's campfire and a modern atomic power station with all the multiplicity and complexity of interaction of its component mechanisms and processes.

The role of mediator M can be performed not only by objects of inanimate nature but also of animate nature. Once ancient man already knew that external objects had a hidden inner force that could be set into action to achieve his aims, the transition from hunting and gathering to keeping animals and working land, dictated by material needs, also gets its explanation in an aspect of the development of cognitive activity. It had to be supposed that the seed of an edible plant also concealed an internal force that could be set in motion and called to life by certain physical efforts of man. Use of its capacity to sprout falls within the context of our three-member scheme: 'if the grain (seed) of a plant is put into the ground then (since it contains some hidden force engendering a new plant in it), a plant appears again that yields seed'. The same can be said of the breeding of animals for food, or to use them as beasts of burden or as another intermediary force.

The introduction of newer and newer mediators between man and his environment meant a step by step extension of the sphere of natural forces that he had subordinated to himself, forcing them to operate in his interests. Many of the ancients' guesses about the possible use of these forces could be called major discoveries of the primeval epoch, in spite of their seeming simplicity from the modern standpoint; and their practical use led to substantial results in the evolution of society. The radical shifts in the sphere of the economy, for example, caused by the domes-

tication of plants and animals were a critical epoch in the development of primitive society that has come to be called the neolithic revolution.[5]

As man passed to practical application of more and more complicated systems M, he penetrated more and more deeply into the secrets of the 'black box', passed from understanding and practical use of separate results of the operation of objective laws to understanding and application of the laws themselves. It is beyond the scope of our book to go into the details of the transitions that followed one from the other during man's ever widening mastery of natural forces, and development of the mechanism of the logical reflection of objective reality. But it will already be clear from what we have said that this development quite naturally led in time to the origin of notions of the 'self-action' of objects and forces of nature as a 'self-action' that could be performed without human involvement, ideas, for example, that the sun has an inherent inner capacity to generate light and heat.

The rise of such ideas was a new stage in the evolution of man's thinking capacity. While the notion of the 'self-action' of external mediators had previously not yet been separated from notions of the subject's own actions that caused it, it now became possible to make this differentiation in the aspect of thinking. That meant, at the same time, however, the rise of a possibility, on the one hand, of passing from 'manual' thinking to abstract thought and the performance of mental operations as a special faculty of the subject's that is relatively independent of the performance of physical actions to alter external objects and, on the other hand, also of reflecting events taking place in the environment as ones brought about by the operation of objective causes existing in nature independently of man. The original logical scheme 'if R_a, then R_b (through mediator M)', was developed further and given a new content that did not depend on the people's individual peculiarities, since it reflected an objective link between events in the external world no matter what naive, metaphoric form it was given.

From the heights of modern knowledge one can speak ironically about the primitive character of the Greeks' notions that associated the sun with the image of a mythical charioteer. Helios, who drove in the sky daily at dawn from the east coast of the sea in a chariot drawn by four fire-

breathing horses, and in the evening sank down again in the west into the cool sea waves so as to cool the horses and himself, heated by their wild daytime exertions. We, of course, now know that such a notion of the sun is a myth that does not correspond to reality, but we sometimes forget that it contains a 'rational kernel' of objective truth quite inaccessible to the perception of animals. This kernel is that a capacity to generate light and heat, and apparently to move relative to a given spot on the earth's surface, was ascribed to the sun. And this capacity inherent in the sun, belonging to it, and included within it, was considered the cause of the illumination and heating of earthly objects, and of the succession of day and night.

Today's scientific ideas about the thermonuclear reactions taking place within the sun as the source of thermal, luminous, and other radiation were formulated quite recently. It is quite possible that the latest ideas of our day about the processes taking place in the sun will seem quite primitive to our remote offspring. Views are already being expressed that the level of knowledge now attained about the patterns of nuclear processes does not enable us to answer questions about the character of the processes within the sun; it is not ruled out, in particular, that these processes are linked with the existence of a 'black hole' in the sun.

There is an immense difference, of course, between notions of the sun like the image of Helios and as an astronomical object with a 'black hole'. Nevertheless, it can be said that there is something substantial in common between them, since they are essentially ideas of *Homo sapiens*, and not of animals that do not possess reason. The essentially common is that both notions reflect an objective property of the sun, its inherent 'capacity' to generate light and heat.

Kant (following Hobbes and Hume) noted a difference in principle between statements (judgments) of the type of 'when the sun illuminates a stone, the stone becomes warm' and 'the sun heats the stone', which was that the first statement ('a judgment of perception') contained no knowledge of causality, while the second ('a judgment of experience') included a grasped causal link. According to Kant, this difference stemmed from the fact that the first statement lacked an *a priori* basis, while the second was an *a priori* synthesis of sense data.

If we discard the idealist premiss about the human mind's *a priori* capacity to introduce order into nature, including

causal relations (a premiss whose erroneous character has, we think, been quite clearly demonstrated above), Kant's idea about the qualitative difference between such judgments is correct. Statements of the first type contain a reflection of the superficial sequence of events accessible to direct sense perception according to the relationship $S \leftrightarrows N$. Psychic reflection of this sequence (the series $r_1, r_2, \ldots r_n$) takes place even at the level of unconditioned and conditioned reflexes (e.g. in experiments with dogs: when a lamp shines food will appear).

It is another matter that animals cannot objectify this sequence in the form of a statement of judgments of perceptions. They simply do not yet feel, and cannot, a need for external (linguistic) objectivising of the reflection of this sequence because, for them, the source uniting the links of the chain of successive events into a whole of sorts is (as already mentioned) the inner activity of the living organism as an entity and the projection of perception of events onto the integral background of an instinctive sense of self-preservation.[6] At the sensory level of anticipatory reflection animals are capable of 'anticipating' the coming of warmth after sunrise but cannot attribute an active capacity to cause light and warmth to the sun, i.e. to relate to it as the mediator-producer that contains the cause of the conversion of darkness into light and of cold into warmth.

With the genesis of representations of a capacity in external objects (included in a logical scheme already formed in man's head) for 'self-activity' without any human involvement, for example, notions of the sun's 'life-giving' capacity to produce light and heat, the logical scheme 'if R_a, then R_b (through mediator M)' gets a further development and a new content without losing its original wholeness. To the extent that man abstracts, in his mental operations, from acts of bringing external mediators into action through the application of his own physical efforts, the place of the first member in the logical scheme has been taken by mental reflection of the state of the external object before it was affected by the 'self-acting' mediator M, and the place of the second member by reflection of its state as altered by the effect of the mediator.

The possibility of such a replacement is implicit in the scheme 'if R_a, then R_b (through mediator M)', because the final result of the interaction $S \rightarrow M \rightarrow N$ was perceived as vitally important to man precisely because the effect of

a tool on part of the environment was to alter it, translating its state from one unsatisfactory for supporting human life to a satisfactory one (for example, a heavy stone thrown 'transforms' a dangerous live enemy into a dead, and therefore not dangerous thing). This possibility was also realised of logical necessity in the operation of the mechanism of the gradual development of practical and cognitive activity (described above). The logical scheme began to be used in that way for mental reflection of the link between phenomena taking place in the environment without any involvement of human physical efforts in the results.

That moment was of fundamental importance for moulding and developing conceptual thought, because it then became possible to reflect objective material processes in consciousness as ones that existed outside man and his consciousness, and independent of consciousness (or intuition). The first kernels of absolute objective truth appeared in the subjective logical scheme, i.e. an invariant content that did not depend either on an individual person or humankind as a whole. The subjective logical scheme began to coincide with the 'objective logic' of nature, and in that sense became 'identical' with it to the extent that the objective patterns of the material world found adequate, reliable reflection in it. This logical scheme can be depicted symbolically in the following much simplified form:

'If A, then B (through mediator M)',

in which A and B designate various states of the environment independent of the subject, which are linked together into some whole unity by the action of a mediator-producer M, also independent of the subject.

To continue our example of the sun, we might say that since primitive man attributed an internal, life-giving capacity to it to generate light and heat, a change in the state of the environment caused by its effect would have got reflected in ideas (within the logical scheme introduced above) in the following mental operation: 'if it is dark and cold, then (due to the sun's capacity to produce light and heat), it will become light and warm when the sun shines'.[7]

It will readily be concluded that this scheme might (in the course of man's cognitive capacity) have been filled with a more concrete content of mental reflection of the relation between phenomena occurring in the environment:

for example, 'if stones are cold, then (through the sun, capable of heating stones it shines on) those that the sun shines on will become warm'. By removing the brackets enclosing the description of the mediating representation, we can write the scheme as follows: 'if the sun is capable of heating stones it shines on, and it shines on stones, the stones will be heated'.

In a mental operation of that type, it may be noted, there is already the possibility of its being developed into an inference containing a conclusion from two premises: for example, (1) the sun heats stones it shines on; (2) this stone is illuminated by the sun; (3) consequently, it is heated. The generalising of such inferences leads to a syllogism in which both the premisses and the conclusion (deduction) are ideal formations reflecting the objective link between phenomena in the form of a naturally arising and developing logical scheme that links separate components of the ideal formations (which can now be called individual concepts) into an integral formal-logical system of mental operations.

With the rise of logical thought the sphere of the subject's emotional experiences is transformed. While, with the organism's direct interaction with the environment, the role of emotions consisted in self-regulation of the organism's functions, now they are involved in addition in the fashioning, putting into motion, and regulating of the 'self-activity' of the external mediator (for example, the making of fire, the lighting and keeping burning of a campfire). Insofar as the organism's self-experience is transferred to the 'self-experience' of the mediator, it is alienated from the subject, and while it is perceived as vitally important, it is already an 'experience' of an external object foreign to the subject, because the mediator set in motion now operates by itself (for example, it is the campfire that burns and not man himself, though it was lit by him). The act of the genesis of thought through the creation of a mediating representation is therefore connected with the action of living imagination and is accompanied with an emotional experience. But, in passing through an emotionally experienced dawning, thought is liberated from emotions, and acquires a character independent of subjective experiences to the extent that it reflects a course of events alienated from the subject and external in relation to it, and mentally grasped as the result of the creation of a given mediating representation.

The difference between reason (mind) and understanding (a difference already noted by ancient philosophers, which has come down subsequently through many philosophical systems) comes out here. In short, understanding can be defined as a capacity, alienated from emotional experiences, to operate with concepts according to the rules of a formal logical system (the structure of the logical system and the content of the concepts having already been given by man's preceding development of practical and cognitive activity). Rational thinking can provide new knowledge within the limits of the content of the system of knowledge built up, but it cannot give this system another content or lead to the creation of a new system of knowledge a need for which becomes particularly clear when facts are discovered that are incompatible with the old ones. Employing the terminology of the American philosopher Thomas Kuhn, we can say that rational thought operates basically within the paradigm of the period of 'normal science'. But insofar as 'anomalies' build up in an old system of knowledge through the influence of new interpretations or newly discovered facts, that are unresolvable within its context, the time comes for 'revolutionary transformations' of this system. A leading role is once more played in that by creative imagination accompanied with an emotionally coloured striving to transform the unsatisfactory situation existing in science into a satisfactory one, and to connect the various contradictory facts mentally into an ordered whole at a new theoretical level. The activity of imagination leads to emotionally experienced guesses, 'dawnings', new concepts, hypotheses, conceptions, and paradigms—in short to the creation of new mediating representations as a link leading to change of the previous content of knowledge.

Although the human emotions that accompany the development of understanding are genetically associated with animals' emotional reactions, they are no longer those that animals experience when striving to satisfy their physiological needs. There is an intellectualisation of human feelings that we shall touch on again later. Here, however, we would note that the new mediating representation, having fulfilled its creative mission, is dissolved as it were in the new content of the knowledge generated by it and disappears in the whole entity of the formal logical structure filled with a new content.

The real or imaginary links established between various

events by imagination can lead to a complicating of the logical scheme, but cannot break it up or alter its integral unity, or go beyond the rules of the mental operations stemming from it (otherwise there is the risk that imagination would be converted into a rambling, incoherent delirium).

Understanding and imagination are two aspects of reason through which continuity and logical orderliness are guaranteed in the development of knowledge on the one hand, and a possibility is opened up, on the other, of creative development of knowledge and of establishing an interconnection between the various facts that do not fit into the previously created mental picture of the world, and of passing through practice to an ever deeper penetration of the mystery of the operation of objective laws.

As we have already remarked, the first idea was still inarticulate, and only acquired the character of a differentiated whole over the course of thought's further development. But when we examine the cognitive process from the standpoint of an already formed subject of knowledge, taken as the result of the whole preceding evolution of mankind, the process of understanding appears as a unity of induction and deduction, a mental ascent from the particular to the general, and the creation of a new 'universal' requiring the involvement of imagination, while a reverse transition takes place within the context of rational thought.

The transition to labour activity with tools, and the rise of a faculty for logical thought evoked by it, led to a transformation of the instinctive sense of self-preservation and sphere of emotional experiences in other important respects as well. The transference of man's own vital activity to external objects as his other opened the way for the subject's being able to relate to himself mentally as another, to appreciate his vital activity from the standpoint of the other, to see his Ego from outside, as it were, and return the representation of himself 'carried outside' back into his integral Ego. In other words the possibility of self-knowledge and of self-consciousness was discovered as the subject's integral appreciation of himself and his place in life.

The basis was thus laid for awareness of instincts, and man's emancipation from blind obedience to instinctive, emotional stimuli; the subject developed conscious control over his actions, and a capacity to subordinate both exter-

nal circumstances and himself to the tasks of overcoming obstacles in the way of attaining a set goal—in short there began formation of that feature of the thinking subject that we call will.

In this connection a rare case recalled by Grzimek presents interest, namely that of the raising of a female gorilla in a human family from infancy to the age of 36. In the view of a member of that family, the gorilla was incapable of self-control, and that was the biggest difference between her and humans, a difference much more substantial than inability to speak. Her sole attempt at self-control was expressed in her trying to stop intercourse with a friendly creature as soon as she felt that excitement and groundless anger were carrying her away.

The transfer of subjective emotional experiences to external objects that accompanied the initial stage of the forming of consciousness (including objects of inanimate nature) led, so to say, to the subject's relating himself to objects of his environment as to living, feeling creatures. That led to important consequences of a transformation of the whole sphere of his emotional attitude to reality and himself. Primitive man did not know what inner forces were hidden behind the external aspect of things, but he had no doubt of the 'fact' of their existence any more than he doubted that a stick he set on fire burned and had an incomprehensible capacity to turn darkness into light, cold into heat, and so on.

Primitive man's dependence on the action of the mysterious natural forces (and likewise of forces of his own relationships with other men), being discovered by his dawning consciousness, was reflected in it as an attribution of friendly or unfriendly intentions to those forces, which ostensibly influence his fate. The savage tried by his actions (including sacrifices, charms, etc.) to bring the good or evil intentions of these forces into line with his own, and strove to establish harmony with them. In spite of all their naiveté, such views already contained the beginnings of the establishing of a sensual experience of good and evil, the beautiful and the ugly, etc., that is to say the beginnings of ethical, aesthetic, and other intellectualised feelings, albeit in still undifferentiated, syncretic forms. Primitive man can hardly be blamed that the universal dependence and mutual conditioning of phenomena of the material world opened out before him mainly in a still fantastic, distorted form. The important

point is that he discovered this link, while it remained inaccessible to animals.

The transition to labour led as well to a qualitative transformation of the feeling of need. Positive and negative emotions now began to be linked not just with the satisfaction or non-satisfaction of certain direct physiological needs. It was already then, for example, when men began to understand the significance of tools in their lives, that the making of a tool began to give them an emotionally experienced satisfaction that dominated the negative emotions of the unconditioned-reflex pain irritation very probable when one external object was being worked by another (though the fact of the making of a tool is not an unconditioned-reflex reinforcement).

It is well known that man's spiritual needs, and not just his material ones, developed with the evolution of society. Satisfaction of the latter, moreover (for food, clothing, housing, etc.), in spite of its difference from the satisfaction of animals' physiological needs, occupies first place in the life of society, because it is incontestable that exchange of matter with the environment remains a necessary condition for maintenance of the life of any organism, including the human one. But man produces objects of individual consumption by means of tools, so that the production of tools and productive consumption have become as necessary elements of human consumption as the production of objects entering individual consumption.

A schematic representation of the periodically recurring cycle of satisfaction of man's material needs can be represented as follows in very general form (employing the symbols we used earlier):

$$r_k\,(r_{\bar{k}}) \rightarrow \boxed{M:(m_1, m_2 \ldots m_n)} \rightarrow \boxed{N} - \left[\begin{matrix}\boxed{r_n} \\ \boxed{m^1}\end{matrix}\right] \rightarrow r_{k1}$$

There is hardly any point in making a detailed comparison of this scheme with the earlier ones of the chain of animals' actions to satisfy their needs, since the difference between them is obvious. Let us simply point out that $\boxed{m^1}$ here signifies an aggregate tool newly created in the process of labour, $\boxed{r_n}$ represents the objects of individual consumption created, and r_{k1} a newly satisfied need.

The difference of principle between this chain and operant conditioning consists in particular in the chain of intermediate results being here not one of the successful actions of the living organism itself but of the interconnected actions of external objects (parts of the mechanism of a machine; a successive chain of chemical reactions, or of technological processes, etc.). Men's actions have a quite different character in the intermediate stages than the operant conditioning of animals' actions; they consist in maintenance of the conditions of 'self-activity' of the aggregate tools, and in ensuring passage from one stage of the working of an object of labour to another, and so on.

When we are examining the qualitative transformation of all aspects of direct sensory reflection caused by the transition to rational reflection of reality, we must pay special attention as well to the following very essential circumstances connected with the qualitative alteration of sensations, perceptions, and representations. The genesis of a mediating representation as one of an inner capacity for self-activity attributed to external objects meant the appearance of a new basis for identifying and differentiating sensually perceived external objects. The vital significance of objects of the environment began to be appreciated not just in connection with how far their shape, colour, odour, etc., signalled an impending, unconditioned, biological reinforcement. Man began to approach evaluation of the external form of objects from another angle, namely from what 'capacities' the inner forces latent in it possessed, what actions (vitally useful or dangerous) the object could produce when the capacities latent in it were set in motion. The information obtained about external objects from the sense organs now passed through the 'prism' of a mediating representation, as well as being projected onto the instinctive sense of self-preservation.

That meant that this representation became a criterion, as regards psychic reflection of reality, that formed the basis for an objective evaluation of the sense-perceived image of the external object as a mediator-object. The regularity of the *appearance* of an unconditioned reinforcement following the fixing of an externally observed object was no longer the invariant that enabled the object to be sensually differentiated according to its shape, colour, etc., from other objects of the environment (similarly to the way aquarium fish distinguish a circle from a triangle, a yellow circle from

a black one, etc.). The basis of mental differentiation of an external object from a host of others became its regular *capacity* (reflected through the mediating representation) to perform precisely an action leading to identical results of its interaction with other external objects, and no others. The effectiveness with which this was done functioned here as the external object's special inner determinacy, whose reflection in consciousness made it possible to create concepts of the *qualitative* determinacy of the external mediator-object as a determinacy included in itself and enabling it to be correlated with itself as an object identical with itself. The qualitative determinacy of the object functioned as an articulated whole. But behind this identity of its inner qualitative determinacy there was hidden a capacity for 'self-action' displayed in it as a process of interacting with other external objects that led to quite definite results.

It is important once more to stress that the qualitative determinacy of an object functions as its identification with itself according to its capacity to perform certain actions rather than according to its outward appearance (shape, size, colour, etc.). It is not its external form that determines its quality; on the contrary, it is its qualitative determinacy (in the sense used above) that serves as the basis for the subsequent differentiation of objects according to their sensually perceived appearance. Although the qualitative determinacy of an external implement got its original mental reflection in the naive form of attribution of an inner capacity to it to perform certain actions, that subjective reflection already had an objective content, which consisted in the real (and not imaginary) aspects of the qualitative determinacy inherent in the mediator-object being displayed (and revealed) during its interaction with other external objects.

The sensual image of the external mediator-object perceived by man just emerging from the animal kingdom, began to be qualitatively distinguished from animals' direct sense perceptions of external objects. Man's sense perceptions of an external object already contained an idea to the extent that they included a mediating representation of the external object's internal capacity to perform certain actions. We shall call these perceptions and representations mentally visualised (or rationally sensed) images.

The origin of the *mentally visualised image-perception*

meant that man began, even with the same structure of analysers, to perceive objects of the environment differently to his animal ancestors. His sense apparatus might have been inferior to that of the animal in its resolving power, but he noticed things in external objects that were inaccessible to the animal (recall, for instance, the comparison between the human eye and the eagle's). Man 'saw through' the external envelope of things to features hidden in them that were brought out by his practical use of them during the working of one external object by another in the course of labour operations.

Such 'seeing' of the external world by man has nothing in common with rationalists' claims that man has a capacity for direct perception of the truth by the 'eyes of reason', by-passing the primary information obtained from the sense organs. At the same time, however, mentally visualised perception is no longer reducible to direct sense perception, since some one feature of the external object is perceived against the background of its functional purpose as a mediator, established by practice. And when any feature of an object (e.g. the size of a stone) proved useful for an implement's performance of the function of a mediator, it was fixed in the memory, though there was no direct biological reinforcement associated with it.

The mentally visualised image-perception fixed in memory, and mentally reproduced in the absence of the object of the perception over a given interval of time, functioned as a mentally visualised *image-representation*. Here again the profound difference between such a representation and a directly sensed one is revealed. The latter is inseparable from an emotionally felt recollection of the satisfaction or non-satisfaction of a need felt in the past, or an emotionally coloured expectation of the occurrence of an event previously experienced. The mentally visualised representation of an external object was freed from its shackling links with emotional experiences to the extent that it reflected the action of a given external object rather than the subject's own action. The image of the external object could now be evoked in memory irrespective of whether the subject had felt any directly experienced need for it. Man could now operate mentally with images as ideal formations 'transferred' outside his organism, and think about events and things in relative independence of the time of their occurrence (for example, about a forthcoming labour operation to obta-

in a foodstuff without experiencing a feeling of hunger and without performing the operation at that given moment).

Initially a mentally visualised representation coincided with a mediating one and therefore contained the contradiction of the latter. On the one hand it was a mentally fixed, sensually perceived image as a 'copy' reproduced in memory with a certain resemblance to the external object of the thought. On the other hand it was a representation of an inner determinacy of an object that was itself hidden from direct observation as its inner essence, and was discovered mentally only through the results of man's activity directly accessible to observation. From this second aspect a mentally visualised representation already contained a *concept* of an object and the concept coincided initially with a representation of its qualitative definiteness (determinacy) among a host of other objects although it could not at first be given a clearly defined conceptual form. In many respects the concept was still the prisoner of that aspect of a mentally visualised representation that functioned as a sense-perceived image. The concept was gradually differentiated into a relatively independent phenomenon of thought in the course of the further development of labour activity with tools.

Constant practical use of a tool led to its revealing its various inherent attributes and properties during its interaction with other external objects differing from it. These attributes and properties began to be mentally differentiated from the initially undifferentiated unity of qualitative determinacy, as special parts of its preserved wholeness.

Once primitive man established in practice, for instance, that a heavy stone that could be held in the hand and thrown with force at an enemy inflicted a mortal blow on it, the stone's 'capacity' to inflict such a blow became a basic factor in appreciating the attributes and properties of stones (their weight, size, shape, etc.). All these properties were initially perceived together, in an undifferentiated way. But (in contrast to conditioned reflex perception) the direct source of the wholeness of this perception was no longer an instinctive feeling of self-preservation but the concept of the determinacy of stones, which was mentally fixed as their inherent capacity to inflict a mortal blow. Stones used during the hunt, or in beating off the attacks of enemies, were evaluated according to how far they successfully performed

the function of attaining that result. The effectiveness of the performance of a function also figured here as the qualitative determinacy of a stone, which contained the undifferentiated unity of its various properties and attributes in undeveloped form. Reflection of this determinacy in primitive man's head was already creating the conditions for choice and preparation as weapons, of those stones that had proved in practice to be able to inflict a fatal blow more effectively.

The constant use of stones as weapons to inflict blows led to the conclusion that a pointed stone plunged or thrust into a victim by its sharp, pointed end yielded the desired result with a greater degree of success than a round stone. That circumstance stimulated the making of sharp stone weapons, and also a striving to use them in such a way that they affected the body of the object of the hunt or an attacking enemy with their points. The attribute of being pointed or tapered was thus mentally singled out from the qualitative, undifferentiated nature of this weapon, and independent significance was attributed to it in consciousness which became reflected in a new concept. Weapons with a pointed (conical) shape were thus differentiated in practice and mentally from other external objects as a special group according to the attribute of pointedness.

The mental singling out of pointed shape and its reflection in a special concept were an act of abstraction and ideal identification of weapons according to this common attribute of theirs, with relative abstraction from other properties and attributes that constituted the weapon's undifferentiated, qualitative determinacy. The external shape of the object was thus mentally singled out from its material elements. Once this form got relative independence in consciousness, the concept of it was more or less immaterial to reflection of its material substratum in consciousness. The role of a sharp weapon could be performed by a stone, stick, split bone, etc., of the appropriate shape; it was only important that they successfully 'coped' with the function of inflicting a mortal blow on an enemy or an object of the hunt. It thus became possible to identify various objects mentally by their outward shape.

Although the concept of conical shape was singled out as an independent one in the initial period of its formation, it still had an undifferentiated character as regards its volume. It was the concept of the object's pointed shape 'in

general', in contrast to the shape of objects that did not have the attribute of pointedness, an attribute that indicated its usefulness in practical use. Primitive man differentiated sharp stones from all others, still without distinguishing at what angle of the cone this shape 'was sharpened'. The angle might be blunt, straight, more or less sharp; these features of the pointed form were still perceived together. Only in the course of further practical use of pointed implements, and in accordance with the results of using them, did man begin to distinguish the sharper form of the weapon from a less sharp one, and endeavour to make tools of an appropriate shape more suitable to his purposes. That opened up a possibility of mentally distinguishing the *quantitative* determinacy of the shape of an object, as yet still in a very general, unconcretised way (for example, 'this object is more pointed than that'). In the same way concepts of other attributes and properties of external objects (size, hardness, weight, etc.) arose, stemming from the practice of using and making implements.

It is not difficult to trace how a host of other attributes and properties were singled out in like fashion from the original undifferentiated wholeness of the reflection of an object in consciousness. The objects of the environment included in man's practical activity were subjected to reciprocal processing that revealed their ever expanding wealth and variety to his mental gaze, and brought about an ever greater concretisation of knowledge of external objects. On the other hand, however, development of a capacity for mental differentiation of objects' separate attributes and properties meant confirmation of the growing role of abstract thought. The faculty of abstracting made it possible to discover deep causal relations between objectively existing objects, and to disclose laws of the development of the material world hidden from direct sense observation. It is not always noticed that the basis of many modern discoveries had already been laid at the dawn of human society. That is true not only of the fact that there would have been no modern civilisation without the birth of the first cellule of logical thought from the union of primitive man and tools, and without the development of that cellule during the complication of human activity, but it is also true in the narrower sense that there is a link between certain naive notions of savages and modern ideas of fundamental science, in spite

of the seemingly impassable gap between them in depth of penetration into the essence of phenomena.

In the early stage of man's development, in fact, he could already mentally distinguish certain attributes of objects from their isolated bearer, which created a possibility of a generalised grouping of objects according to some attribute they had in common, and of establishing the identity, on that basis, of objects that differed from one another. And insofar, for example, as the property of weight was isolated in consciousness from a single object and became recognised as an inner property common to various objects, the possibility arose of a quantitative comparison of quite dissimilar, qualitatively different objects. That possibility was realised later in a lump of clay being comparable in weight, for example, to a piece of iron, and so on. The subsequent development of abstract reflection of the property of weight, associated with progress in practical and cognitive activity, played its role centuries and centuries later in discovery of the fundamental law of universal gravitation, which led in turn to the construction of modern theories of gravitation.

The genesis of logical thought also qualitatively altered the aspect of direct sense perception that in animals is called orientation reactions. Animals, as we know, react to unfamiliar external signals (the appearance of an object not previously encountered in their field of vision; an unusual sound, etc.), becoming on the alert and trying to determine whether or not this new signal is associated with danger to them or whether, on the contrary, it is a signal of the presence of an object that will satisfy some biological need. And if the newly discovered object, on further 'investigation' by the means available to the animal, limited by the structure of its analysers, and by the specific features of the structure of its bodily organs as regards opportunities to affect the object, etc., proves to be quite neutral as regards its significance for its life, the animal will simply cease to notice it.

Once man, however, discovered that there was a hidden force behind the outward appearance of things, he was not satisfied with external examination of an object by direct observation. He tried to elucidate whether it could be adapted to use as a mediator of sorts, and endeavoured through the action of other objects on it to 'penetrate' into the object that interested him in order to learn what force exactly was

latent in it. Man separates the object into parts (analyses it) in practice, and later by mental operations, and puts it together from its parts (synthesis), and also joins it with other objects. In contrast to animals' elementary analytical-synthetic activity (the breaking of nuts, birds' building of nests, etc.), man's investigatory activity has no bounds, just as the world around him has no finite bounds, because on passing from a phenomenon to its essence, from essence of the first degree to essence of the second, and so on, he discovers more and more deeply hidden patterns of objective reality calling for explanation, and in the end finds this explanation, and thereby again discovers the incompleteness of knowledge of the eternal, infinite material world. He thus comes endlessly closer to understanding of absolute truth, confirming in practice the objectivity of knowledge contained in relative truths.

The transition to labour led to a transformation, as well, of the sense of self-movement (kinaesthesia). Whereas this sense (sometimes called muscular) had previously been limited to the movements of the animal's organs including movement of its organs of vision, external motion of its body towards vitally useful objects (or away from dangerous objects), grasping motions, etc., now the sense of self-movement was transferred to the self-movement of external objects; at first to the 'self-movement' of external mediators actuated by man and later to other objects.

We shall not dwell on the consequences of the transition to labour (widely discussed in the Soviet literature), i.e. the transition to erect posture, freeing of the hands to perform various operations (which ultimately led to transformation of the clumsy, awkward movements of the anterior extremities of anthropoid apes when handling external implements to the organ of the human body, so perfected in its universal plasticity as the hand of a virtuoso violinist or a painter). Here we would draw attention to the fact that kinaesthetic sensations are often given a special role in the psychological literature that consists in their uniting various sensations in the integral image of an object, while forming part of all sorts of perceptions. In other words, they are a subjective source, from that standpoint, of the wholeness of the image. In our view this thesis needs refinement.

Kinaesthesia is one aspect of the living organism's reflective activity directed to maintaining its integrity in its di-

rect relationship with the environment. To the extent to which kinaesthetic sensations characterise this direction of the organism's activity, and the vital process of its self-movement, they can be regarded as the subjective source of the wholeness of sense images, if one remembers that the source of their own wholeness goes back in turn to the instinctive sense of self-preservation. But, as follows from the foregoing exposition, this proposition cannot be extended to man's kinaesthetic sensations without substantial reservations.

The objective basis of the integral wholeness of the subjective sense image of an external object is ultimately the definite wholeness of the object itself, independent of sensations. That statement, confirmed by practice, raises no doubts or discussion in dialectical materialist epistemology. But we are concerned here rather with the *subjective* source of man's faculty of forming integral sense images; the answer to what is the nature of this source raises many difficulties.

Many researchers have shown, for example, that the human eye is a 'feeler' (as I. M. Sechenov put it), which is in constant motion during perception of an object, successively 'feeling' its separate parts and the object as a whole. But one can hardly conclude from this that the subjective source of the wholeness of the image is man's kinaesthetic sensations of the movement of the eye muscles translated to the brain together with the visual sensations and 'tied up' in it through the muscular sense into an integral image of the object. (Earlier we spoke of the failure of the associationist school's attempts to reduce the wholeness of the image to an aggregate of separate sensations.) The source of man's subjective capacity to form whole images by specifically human means apparently cannot be discovered without returning to the period of his origin. The special nature of human sense perception has its genetic roots in the time when the faculty to create mediating representations was taking shape.

If, however, we consider man as the 'formed' result of all preceding social and historical development, then, in our view, we must consider the direct, subjective source of the wholeness of the sense image to be the mentally visualised image of the object built up as a result of his previous activity. This result contains not only his individual experience acquired during his lifetime but also that accumu-

lated by his contemporaries, and preceding generations, and passed on to him and incorporated in his individual experience. The subjective source of the wholeness of the mentally visualised images of an object is thus a concept of it whose content is also the product of man's socio-historical evolution in the same way as we explained in regard to mentally visualised images. The concept, in turn, comes genetically from mental reflection (predetermined by labour) of the object's qualitative determinacy as an object identical with itself, but existing independently of any subjective sensations. The developed concept of an external object is ramified into a host of mentally visualised images which associate the idea of it with actual contemplation of it. Allowing for that, we might say that the wholeness of the direct sense image of an object observed by man is given by mentally visualised images of it built up phylogenetically and ontogenetically, rather than by kinaesthetic sensations. It is not by chance that the eye, when examining an object, 'rests only on certain elements of the objects of vision, and very little on others, and quite ignores certain others'.[8] The human eye, in its scanning movements, often runs over those parts of an object's contours that are most important for singling it out from a number of others from the angle of the level of knowledge of it that the subject has accumulated at the moment of perception.

Strotton's experiments with optical lenses provide good confirmation of the dependence of human visual perception on the specific features of our socio-historical experience. The specific nature of human experience in its most abstract definition is, as we have seen, that man, unlike animals, transfers his sense perceptions to an external object as to 'his other' and passes (through that intermediate stage) to understanding of the external world as an objective reality existing outside him and independently of him. Insofar as that circumstance has already been reinforced in his practical relation with the external world, and correspondingly in his consciousness, he has acquired the capacity to actively overcome the contradictoriness of the situations that create illusions in the perception of objects of the external world.

Such experiments are evidence of the truth of the tenet of dialectical materialism that man recognises the external world as independent of his direct subjective perception of objective reality, and it is not objective reality that is

adapted to the 'aggregate of sensations' but rather the latter to the former. In that way the possibility of his correct orientation in the external world is realised to the extent that an adequate reflection of the objective order of things in consciousness, independent of either direct sense perception or consciousness, is concealed in the sense data. These experiments also confirm that man's sensory reflection of objective reality cannot be reduced to direct sensory reflection. Animals that relate directly to the external world, and therefore cannot 'carry' their sensory reflection outside themselves as reflection of a reality independent of them display a complete incapacity to adapt to perception of the world through lenses that invert the image. They sink into an exhausted, depressed, rejected state accompanied with indifference to the situation around them.

The wealth of very fine nuances of the sense image of objects directly perceived by man, with preservation of the integrity of the image, consequently depends on how far mentally perceived images of them have been developed during previous activity, and on the level of the individual's practical and theoretical mastery of the objects. There are many examples of that in any sphere of human activity. Show a man who is unfamiliar with the fundamentals of nuclear physics a photograph made in a Wilson cloud chamber and he will see nothing except white lines cutting across the dark background of the paper. But for the nuclear physicist the photograph opens up a whole picture of the interaction of 'captured' elementary particles to his mental gaze. He can name each particle and becomes ecstatic when he discovers traces in the photograph of a new, hitherto unknown visitor from the microworld.

One can imagine a situation (during a mental experiment) when a man (with all the knowledge that he has acquired) encounters an object about which he has no information. First of all (if he is sufficiently curious), he will try to establish the identity of the object he has newly discovered with ones he already knows something about. If, however, the new object has no signs of similarity with the mentally visualised images of objects preserved in his memory, he will not, nevertheless, unlike an animal, take as the starting point of his evaluation whether it is edible or, on the contrary, whether it is capable of 'eating' him himself.

In normal conditions a man encountering an object quite unknown to him for the first time would reflect it in the

form of a judgment (since he already possesses the faculty of conceptual thought): 'this is something'. In other words, he would create a mediating representation of it containing a unity of his sense perception of it and the concept of it as 'something'. In that concept its determinacy would be reflected mentally in undifferentiated form to the extent that it was dissimilar to any known object. On the other hand, as soon as it became accessible to direct sense perception precisely as a really existing object, it could no longer be nothing for him ('not anything'). In appropriate conditions of the continuation of practical and cognitive relations with it, the mental process of differentiation of its separate attributes and properties that we have already considered would have taken place, and it would have been identified and differentiated from other objects in accordance with them, and so on.

Critical examination of the thesis about the determining role of kinaesthetic sensations as the central link connecting the aggregate of separate, isolated sensations into a single, integral bunch, convinces us that it cannot be extended unreservedly to man since it is a matter precisely of the qualitative feature of man's perception of the external world in contrast to that of non-reasoning living creatures. Given this reservation, the thesis of the synthesising character of kinaesthetic sensations not only does not contradict our initial premisses but rather follows from them. If it is true that the initial source of the wholeness of the sense image, on the 'subjective' side, is in the final analysis the wholeness of the living organism itself as a self-regulating system, then this source must go back genetically to the period of the origin of the first living cell as a result of the gradual evolution of inanimate nature. The striving for self-preservation built into the living cell, and for self-development through the assimilation of vitally necessary resources from the external medium, was realised in the course of the active functioning of the living cell itself. The cell's inner capacity for 'self-action' could also have been the initial moment providing the beginning of the subsequent development of the muscular sense. In that case kinaesthesia must actually have functioned as integrating factor in relation to other sensations. But then we would have to make a number of substantial reservations connected with the fact that kinaesthesia did not unite separate, isolated sensations into a wholeness during the evolution of the living cell, but on

the contrary branched out in a bundle of increasingly diverse sensations.

As for man, this property of kinaesthesia may be applied to him to the extent that he is regarded biologically as a species of animal. Since matters stand so, experiments on people (carried out according to the methods of experiments on animals) should have led to discovery of a flowing together of an observable number of isolated sensations in a common stream of kinaesthesia. But if we set ourselves the aim of seeking not the common root of the genesis of animals and man but of examining the qualitative features that single man out precisely as man from the world of animals, then the unsatisfactory nature of the approach to kinaesthetic sensations as the direct source of the tying together of various sensations in the integral image of an object becomes clear. At the level of human conceptual thought the kinaesthesia of the body is supplemented by the 'kinaesthesia' of thought. The thesis of the integrating role of kinaesthetic sensations, without its subsequent dialectical materialist deepening, may be employed by spokesmen of Kantian and other subjective idealist conceptions, associated largely with an uncritical transference of the dyad 'subject-object' to man's cognitive activity.

At the same time living awareness of reality, and its reflection in sensations, including kinaesthetic ones, were and are the sole source of our knowledge about objective reality. Sense perception of new facts disclosed during the development of practical and cognitive activity is the initial element in the deepening or breaking of previously acquired knowledge, when the newly discovered facts will not fit into the context of the old system of knowledge.

In conclusion it remains to examine certain aspects of the qualitative change in anticipatory reflection as a whole, associated with the transition to logical thinking.

We said earlier that the organism already exercises a kind of control over the fatal 'miner's fuse' reaction in the chain of results r_1, r_2, . . . r_n at the level of conditioned reflexes (in contrast to unconditioned reflex activity). And if the rise of r_1 switches on the whole chain of subsequent results automatically leading, through a number of mediating links of the chain (r_2, r_3, . . .), to a certain result r_n that is, for example, dangerous to the organism's life, the organism that has fixed the occurrence of r_1 will have an advance presentiment of the future result r_n and, in order

to avoid the danger, will stop operation of the switched-on chain, trying to turn the direction of its activity into another channel. When the initial result is associated in the organism's psyche with the end result, this anticipation of events, bypassing all the intermediate links so as to introduce corrections into its activity, can be called *sensory intuition.* And it is this anticipation that constitutes the difference between sensory intuition and instinct (with its uncontrollable automatism).

Since the individual links of the chain of actions are not tied together directly other than through the activity of the organism itself, its establishment by sensory intuition of a link between the results of separate actions, skipping the intermediate links, has only a subjective and probable character. The organism perceives the objective recurrence of external events in its direct interaction with its environment only as the recurrence of its own experiences. In that case, the objective source of the link between events, independent of the animate system, is beyond the system's capacity to reflect it, and the connection between the events is therefore not objectified as something distinct from the results of its own activity, and there is no external object uniting them.

The position is greatly altered, however, with the transition from direct to mediated interaction with the environment, and the genesis afterward of logical thought. The sequence of external events is now united in the subject's psyche through the interaction of the external objects themselves. The 'miner's fuse' reaction, which was previously not differentiated from the instinctive sense of self-preservation, and was fixed through emotional experiences and sensory intuition, goes outside the organism, as it were, with the genesis of consciousness, and is reflected in consciousness as the inevitability of the development of a certain sequence of events (e.g the onset of cold winter weather after the autumn), independent of it, and separate from its body. Man thus acquired the faculty of averting the dangerous effects of the foreseeable results of objective events not through adaptive changes of his organism (e.g. the accumulation of glycerine in cells, or the growth of a thicker coat, or hibernation, etc.), but by bringing other external objects and processes into action (e.g. use of the skins of killed animals as clothing, the lighting of a campfire, etc.).

The stochastic character of anticipatory reflection also

underwent qualitative changes with the transition to logical thought. When the intermediate link was created and set going, its action was equally conclusive for man irrespective of how often it became an object of observation—once or a thousand times. The recurrence of the results of observations was now related to reinforcement of the process of the mediator's self-movement in man's memory, but the objective process of its self-movement had no relation to the frequency with which the recurrence of the observations was confirmed. When man lights a fire, for instance, the chain reaction of combustion will continue in the appropriate conditions while there is material that will burn, irrespective of whether man watches the fire (or how often) or completely ignores it. Or take another example: the operation of the objective law whereby a sharp object can pierce the body of a victim more easily than a blunt one does not depend on how many times the hunter throws his spear.

The recurrence of subjective observations is now no longer men's direct source of the order of events, but rather their objective pattern, associated with the use of a mediator, becomes the source of the recurrence of observations. In contrast to direct sensory observations the link reflected in consciousness now not only has a subjective, stochastic or probability character but also an objective, necessary one. The choice of direction of man's activity in regard to the environment (in contrast to an animal's) correspondingly also becomes more determined. The probability character of the direction of an animal's behaviour in response to a situation in its environment is evidence of its complete dependence on external conditions that it is powerless to alter. Man, however, has become freer to the extent that he is conscious of necessity and knows how to put objective laws to his use.

With the genesis of logical thought all aspects of direct sense reflection (instinctive sense of self-preservation, sense of need, sphere of emotional experiences, perception and apperception, kinaesthetic sensations, etc.) thus underwent a qualitative change. When treating direct sense reflection as the natural, historical precondition of conceptual thought, we might call it preconscious reflection. The genesis of consciousness, transforming preconscious reflection, does not mean the latter's complete elimination and its metaphysical negation. What takes place is a dialectical negation leading to preservation of direct sensory reflection in rational reflec-

tion in a 'sublated' form. With the development of consciousness, the preconscious is preserved, as the subconscious to the extent that it is not within the sphere of consciousness at the moment.

The subconscious continues to be involved in regulation of man's behaviour, finding a manifestation of sorts in the field of conscious activity. The area of the interconnection of the conscious and subconscious is one of complex problems that have been the subject-matter of many special studies. Here, however, we must draw attention to the very general proposition about their relation that follows from our exposition. If we admit that the integrity of direct sensory reflection in animals is due, on the 'subjective' side, to the wholeness of the living organism itself as a biological system, then the instinct of self-preservation, i.e. organisms' striving to preserve their integrity (as we have already said), underlies the kind of situation that determines their behaviour. With the genesis of consciousness the character of the situation must also have been altered, but it obviously could not disappear. The research of D. N. Uznadze and his disciples demonstrates that the set up plays an important role in regulating man's behaviour. We might say that the character of the situation is altered to the extent that consciousness is realised instinct.

That is manifested in the animal striving to preserve life being replaced in *Homo sapiens* by quests for the sense of life, and the creation of lofty ideals for which people are prepared to sacrifice their own lives. The ideal created by man, like ideal reflection in general, may reflect reality more or less adequately or in distorted form, and may either correspond to the objective requirements of social progress or contradict them. The truly human ideal, worthy of a rational being, is the one that corresponds to the objective patterns of the evolution of nature and society.

With discovery of the objective laws of social development by the founders of scientific communism, ideals worthy of man cannot be created without the moulding of a Marxist-Leninist outlook on the world. Starting from that broadly known tenet of historical materialism, we would note that, as soon as any ideal created by man becomes his inner conviction, it begins to play the role of a subjective situation underlying the general direction of his behaviour. To the extent that the conviction has become a really inseparable, integral inner characteristic of the subject, an essent-

ial quality of his own 'Ego' (relatively independent of the ways it was formed, which may be various), it becomes a guiding factor of behaviour that does not require fixing in consciousness as 'his other'. The conviction functions as an 'inner Ego' returning to the sphere of the transformed preconscious, i.e. to the sphere of the subconscious.

When we speak of the direct source of the integrity of man's perceptions of the external world, which consists in the level of knowledge of the world that he has attained, we specially single out that aspect of rational reflection which distinguishes him qualitatively from the animal, as a specific feature of a thinking being only. But man is not an inanimate reasoning mechanism. He is a living creature, an integral biological organism, and as such bears in himself all the results of the preceding stages of his natural evolution, including the preconscious, animal state in 'sublated' form. The wholeness of his outlook, therefore, moulded on a foundation different in principle and quite foreign to animals, is nevertheless indirectly linked in a complicated way with the wholeness of his biological organisation, transformed as a result of the transition to labour. We can therefore say that the link between the phenomena of the unconscious, preconscious, conscious, and subconscious will receive its further scientific explanation in an integral theory built on the basis of dialectical materialism.

Notes to Chapter 5

[1] See P. K. Anokhin. The Philosophical Sense of the Problem of Intellect. *Voprosy filosofii*, 1973, 6: 93;
B. S. Ukraintsev. *Samoupravlyaemye sistemy i prichinnost* (Self-Regulative Systems and Causality), Mysl, Moscow, 1972, pp. 122-154.

[2] P. K. Anokhin. *Art. cit.*, p. 96.

[3] Cited from B. S. Ukraintsev. *Op. cit.*, p. 147.

[4] B. S. Ukraintsev. *Op. cit.*, p. 175.

[5] V. D. Glovatsky and A.V. Nikitin (Ed.). *Vozniknoveniye i razvitie zemledeliya* (The Origin and Development of Agriculture). Nauka, Moscow, 1967; G. N. Lisitsyna. Through the Eyes of Ancient Artists. *Priroda*, 1968; 11; 74-76;
G. N. Lisitsyna. Cultured Plants in the Middle East and the South of Asia in VIII-V millennia B. C. *Sovetskaya arkheologiya*, 1970, 3: 53-66.

[6]If the debatable question of animals' psychic capacity to possess representations in the form of interconnected reproductive images were ever resolved in their favour that would not, in any way, mean recognition of a capacity in them for cognitive thought. Man is capable of operating mentally with representations as 'copies' of events that happened outside his organism. In an animal, however, the psychic link of reproductive images could only be expressed in changes in its emotional mood engendered by 'recollections' of past events (on condition, of course, that the interaction between it and its environment is really made according to the scheme $S \rightleftarrows N$).

[7] In this connection we must draw attention to Lukasevich's comment that Aristotle originally formulated the syllogism not as a conclusion but as an implication, in which the antecedent is a conjunction of premisses and the consequent a conclusion. Lukasevich also notes that in contrast to traditional logic Aristotle put the predicate first and the subject second. See Ya. Lukasevich. *Aristotelevskaya sillogistika s tochki zreniya sovremennoi formal'noi logiki* (Aristotelean Syllogistics from the Standpoint of Modern Formal Logic), Nauka, Moscow, 1959; N. I. Kondakov. *Vvedenie v logiku* (Introduction to Logic), Nauka, Moscow, 1967, p. 329.

[8] A. L. Yarbus. *Rol' dvizheniya glaz v protsesse zreniya* (The Role of Eye Movements in the Process of Seeing), Nauka, Moscow, 1965, p. 125.

6

Myths and Logic

The difficulties in the way of investigating the logic of the origin of logic itself are made the worse because science has no direct sources providing evidence of the first steps toward the forming of logical thought. The bits of the skeletons of primitive man, and the tools used by him, ancient cave and cliff drawings, etc., enable us to reconstruct their physical appearance, and provide information on their possible way of life, but it is difficult to form an idea of the way the first *Homo sapiens* thought from study of archaeological remains.

We are therefore forced, when examining these problems, to rely on the information we can get from studying the thinking of tribes that have been backward in their development and preserved many features of the primitive, communal system.[1] The myths of ancient peoples that have come down to us are of great scientific value in this respect. Although the mythological picture of the world is later historically than animativistic and animistic ideas, it arose from them, so that analysis of myths can throw light on the peculiarities of primitive thought.

From study of these sources, investigators of the way of thinking of people living in the epoch of the primitive communal system have come to the nearly unanimous conclusion that, in spite of a number of features peculiar to any one group, they all have something in common in their mental perception of their environment and of themselves. This common element is a belief in the impersonal animate character of nature or its separate parts (animatism), and a be-

lief in spirits presumed to control both people and natural phenomena (animism), i.e. a view of the world

> by which men, animals, plants, and objects of nature possess in addition to a sensory-perceptive side, a special, active principle, independent of their corporeal nature—a soul.[2]

This circumstance is widely utilised in idealist philosophy, and in the theological tracts of ministers of religion, to substantiate man's allegedly primordial religiosity, and unscientific statements that it is the existence of a 'religious spirit' that is the main, basic thing distinguishing rational men from all irrational 'creatures'. The concept of the religious spirit, moreover, includes various components, even such essentially incompatible forms of social consciousness as religion and science.[3]

Animals, unlike humans, do not, of course, have a world outlook, let alone a religious one. But it does not follow from this that the cause of the singling out of man from the animal kingdom was the rise of a religious form of reflecting reality. On the contrary, the rise and development of religious forms of consciousness were a consequence of the weak development of the productive forces and relations of production in the primitive communal system. The 'impotence of the savage in his battle with nature gives rise to belief in gods, devils, miracles, and the like.'[4]

Even if we were to start from the assumption that primitive man's childishly naive spiritualising of the objects of the environment, and at the same time of himself, had a religious character, that is not justification of a need to retain religious hangovers in people's consciousness in the age of rapid development of the scientific and technical revolution. The fact that mankind was forced to pass through the system of slave-owning, for example, in its development, does not give grounds for demanding its retention, even though slavery still persists in certain remote corners of our planet; and it hardly enters the minds of sensible people, at the modern level of knowledge, to demand its restoration (except perhaps fascist spokesmen of imperialism striving by any means to maintain the system of exploitation of man by man surviving in our age).

Attempts to substantiate a primaeval religiosity of man are scientifically quite groundless. With close, unbiased examination of the fact of primitive man's original spiritualisation of objects of external nature, it inevitably fol-

lows that the notions of man just emerging from the animal kingdom did not and could not have a religious character. If we try to draw a parallel between primitive thought and the later rise of religious and philosophical notions, then the initial spiritualising of objects of the environment displays a similarity not so much with religion as with hylozoism, the initial premisses of which about the universal animation of things were employed by certain spokesmen of materialism to criticise claims about the divine origin of reason.

In spite of the fact that the spiritualising of objects of the environment contained the germ of a possibility of singling out a spiritual 'force' in consciousness in an independent incorporeal substratum, it took a long period of social and historical development to convert it into reality. The typical notion of religion about the dichotomy of soul and body, of spirit and matter arose much later and had its own social and epistemological roots. Primitive man's initial, original 'spiritualising' of objects and forces of nature did not separate 'spirit' from matter. That is confirmed by the fact that a distinctly traceable idea of the inseparability of the 'spiritual' principle from any of its bearers can be discovered in the animatistic views of primitive tribes that have come down to us (which are undoubtedly a later product of creativity than the 'first' ancestors' views).[5]

There is nothing mystical in the fact that primitive man could differentiate himself from nature around him as a rational creature by 'transferring' his activity to a tool as 'his other'. The anthropomorphising of surrounding nature typical of primitive tribes was at the same time a process of man's recognising himself in the 'mirror' of the inner patterns of action of natural forces discovered during labour activity with tools. From the height of modern knowledge one can, of course, be ironical about the fact that primitive man abstracted this 'vision' of himself in the childishly naive form of endowing inert objects with a soul. But for the time when man was becoming differentiated from the animal kingdom his recognition of the patterns of his own living activity in the 'mirror' of the activity of external natural forces was immeasurably more important than the fact that this 'mirror' still gave an extremely distorted image. For it was already an image inaccessible to the direct sense perception of animals.

A 'curtailed', brief repetition of all stages of his path

of development is peculiar to man not only as regards the stages of the transformation of the biological embryo from the fertilised maternal egg cell into a human child, but also in the course of his mental development. However paradoxical it may seem to say that primitive man's naive views were closer to materialism than contemporary religious notions, or refined idealist philosophical systems, the statement can be supported by weighty evidence.

Surely it is worth noting that, according to the totemic notions common among primitive tribes, exogamous clans trace their pedigree from minerals, plants, birds, and other animals, though it would seem much simpler for them to take the people from whom they were actually born as their ancestors. This circumstance, however, becomes logically quite explicable when the materialist premiss is taken as the starting point, that the first act in man's differentiation from the animal kingdom was recognition of his properties in the properties of the external world. Once we start from the supposition that primitive man initially used objects of inert nature as a mediator-implement (e.g. a stone or a stick), and only later began to pass to use of plants and animals as mediators, we can conclude that totemic pedigrees tracing origin from, say, stones are more ancient, and therefore belong to more forgotten traces of man's establishing his 'kinship' than those fixed in the memory of generations linking it with plants and animals introduced later into the sphere of labour activity.[6]

However that may be, savages' naive notions of origin from stones, palms, wild beasts, etc., are closer to the truth in the final analysis than modern religious myths about man's creation by a supreme, incorporeal divinity after its own image and likeness. Modern science is based on recognition of the origin of living organisms from inanimate nature, and of *Homo sapiens* from his animal ancestor, a wild anthropoid ape.

The mechanism of the transference of man's own activity to external mediator-objects was a necessary, but only 'intermediate', stage to understanding the material world as an objective reality existing outside consciousness and independent of him, which is a *sine qua non* of man's existence.

We shall pay special attention to the initial period of the forming of a rational being because, in spite of the thesis generally accepted in Marxian literature about the decisive

role of labour in the conversion of the ape into man, the concrete mechanism of the rise of logical thought still needs further investigation. As man's practical and cognitive activity evolved there was an emancipating of consciousness from the clan heritage of anthropomorphism. When, for example, the capacity of a sharp weapon to pierce the body of a victim more easily than a blunt one received its explanation in a simple mathematical formula that establishes the dependence of the pressure on the force and area of thrust (the pressure is directly proportional to the force and inversely proportional to the area of thrust), there remained no place for naive anthropomorphism of a sharp object. With the discovery of exothermic oxidising reactions,which are the basis in most cases of combustion, it clearly became superfluous to resort to various unscientific concepts like phlogiston in order to explain this process, let alone to mythical notions going back deep into antiquity of a mysterious capacity of wood to generate fire. The subsequent development of knowledge in this field led to formulation of the theory of ramifying chain reactions underlying explanation of the processes of combustion (including spontaneous combustion, explosions, detonation, etc.), the creation of which is linked with the work of the Soviet Nobel prize-winner, N.N. Semyonov.

It is hardly worth spending time on listing similar well-known examples. It is much more interesting to turn again to consideration of primitive thought so as to disclose its logical mechanism hidden behind its external metaphorical character and still largely sensory visual form of expression. The difficulty of discovering a strictly logical structure in mythological notions is that it is complicated by mutually exclusive assumptions, dissolved, as it were, in a seemingly disordered conglomeration of events and images, in a host of unexpected turns in the lives of the heroes, and the intervention of fantastic creatures possessing supernatural powers, and so on.

The contradictory character of mediating representations included in the structure of primitive thought as a special element put its stamp on primitive man's way of thinking. It was manifested as a contradiction of primitive thought itself, which was a reason for the spread of views about its illogical, or prelogical nature. Such views found expression, in particular, in the work of Lucien Lévy-Bruhl, who claimed that primitive thought did not always fit into the frame-

work of formal logic and its demand of consistency. The thesis of the existence of insurmountable barriers between primitive and 'Western' thought was eagerly seized on by racists as evidence of the mental inferiority of peoples at early stages of social development. To the credit of Lévy-Bruhl himself (as will be seen from his posthumously published work), he was able to surmount the one-sidedness of his approach to evaluating the logicality of primitive thought, and expressed himself in favour of conceptions of the universality of the structures of thought.[7] The first attempts to discover such structures in primitive thinking, and to single them out in the mythological way of thinking from the seeming chaos of metaphorical narration, were successful, in spite of the many difficulties.

In this connection the research of the well-known French scholar Claude Lévi-Strauss merits attention.[8] From a structuralist analysis of the myths of various peoples, he discovered a logical orderliness in them compatible in many ways with the logic of modern times.

> The logic of mythical thought seems to us as demanding as that on which positive thought rests, and at bottom little different. ... Perhaps we shall discover one day that the same logic is at work in mythical thought and in scientific, and that man has always thought so well.[9]

We would like to draw attention to this conclusion, which has a very important place in Lévi-Strauss's whole conception. The aim of a myth consists in a logical model for overcoming some contradiction. The logical instrument for uniting fundamentally opposed aspects, moreover, consists in the introduction of a mediator that also performs the role of a connector of opposites. The mediator is thus endowed with a dual character of guise, behaviour, etc., that also enables it to mediate. The myth of Oedipus, for example, according to Lévi-Strauss contains a logical instrument enabling the contradictions of the initial problem to be bridged: is a man, who is one, born from one or from two? The role of the scalp in Red Indian myths consists in mediating between war and peaceful agriculture (the scalp is the 'harvest' gathered during war), and so on. If the contradictoriness cannot be united by the introduction of just one mediator, a whole number of other mediating images is successively introduced. In that case

> the mechanism of mediation consists in the fundamental opposition of life and death being replaced for example, by a less

> sharp opposition of the plant and animal kingdoms, and this in turn by the narrower opposition of herbivores and carnivores. The latter opposition is removed by the introduction of a zoomorphous creature as a 'cultural hero' that feeds on carrion (the coyote among the Zuni, the crow among the Indians of the north-west coast).[10]

Lévi-Strauss's conclusions about the logic of mythical thought, one may note, have a similarity to our logical scheme 'If A, then B (through mediator M)', following from development of reflection of the interaction $S \rightarrow M \rightarrow N$ in the head of primitive man. But Lévi-Strauss, having discovered a certain logical consistency in the structure of various mythical tales, did not attempt to disclose the real historical roots of the rise of logical thinking. Strictly speaking, it was impossible to do so without passing to a position of dialectical materialism. His attitude to dialectics can be judged from the following:

> Psychoanalysts, and certain ethnologists, would like to substitute interpretations drawn from sociology and psychology for cosmological and naturalist interpretations. But then things would become too easy. Should a mythological system give an important place to a certain person, say a malevolent grandmother, they would explain to us that in such a society the grandmothers have a hostile attitude to their grandchildren; mythology would be held to be a reflection of the social structure and of social relations. And if observation contradicts the hypothesis, they will immediately suggest that the proper object of myths is to offer a derivation to real but compressed sentiments. Whatever the real situation, a dialectic that wins at every turn will find the way to hit on the meaning.[11]

Of course, Lévi-Strauss was right when he objected to the reduction of each separate myth to direct reflection of the social structure and social relations. But the objection can be addressed to advocates of metaphysical materialism and not of dialectical materialism. Spokesmen of dialectical materialism in fact consider the mythological world outlook as a reflection of social existence, but not a direct, mirror reflection; rather an indirect reflection that is the result of primitive man's transition to indirect, mediated labour. And he quite unjustifiably hints that dialectics permits any incompatible hypothesis to be arbitrarily substituted for another. Such a reproach can be directed to sophistry but not to materialist dialectics, because the basis of the latter is not a playing with words but the objective patterns of development of the material world that operate of necessity

irrespective of verbal exercises. Dialectical materialism is therefore no less strict and inwardly integral a science than formal logic; on the contrary, being the most adequate reflection of the inner oppositions inherent in the material world, it underlies the rigorousness of formal logical operations in whatever field of the natural sciences they are applied.

Neither a natural historical nor a dialectical materialist approach to logical schemes is characteristic of adherents of structuralism (one of whose founders Lévi-Strauss himself was), but a striving to extrapolate linguistic models *a priori* onto a broad range of the most varied phenomena. As a result many structuralists arrive at idealistic statements that language and a system of communication (and not socially productive labour) underlie social structures, and that the main thing in the science of man is analysis of unconscious norms, rules, and symbolic groups.[12] The source generating myths, according to Lévi-Strauss, is not practical, mediated activity, but an inexplicable intellectual impulse.

Dialectical materialists, while recognising the role of people's active thinking, do not limit themselves to stating that. In order to bring out the mechanism of the activity of thought as a property of rational beings, it is necessary to explain the origin of the capacity for logical thought, and its structure itself, in a materialist way. This faculty arises, as we have seen, during the passage from the organism's direct to mediated interaction with its environment. Once that capacity has arisen, however, it acquires a relative independence and cannot be reduced to a simple mirror reflection of reality, although the laws of logical thought are given by objective necessity. The logical scheme 'If A, then B (through mediator M)' continues to operate, even when a visible mediator linking the different results of observation is not found in the external world.

When primitive man came up against results that had vital significance for him, he mentally united them according to an already elaborated logical scheme—by means of a mediator, albeit even an imaginary one. Imagined images of mediators thus began to be substituted, as it were, for objectively existing intermediate links. Since primitive animatistic thinking had still not separated thought ('soul') from body, although it distinguished between them, the mental image of the mediator called for its 'attachment' to some external object. An at first glance paradoxical phenomenon therefore came about when the rise of a mental image

preceded the real object in consciousness and was subsequently identified with it.

The link between the vitally important, but obviously different results of peaceful agricultural labour, for instance, and war against neighbouring tribes could thus be reflected in the heads of primitive Indians in accordance with the established logical scheme 'If *A*, then *B* (through mediator *M*)'. The whole system of primitive man's thinking, owing its origin to constant use of actually existing mediators, called for precisely such a logical operation, even when it was not distinctly realised as such. So, for the mentally created image of the mediator to be able to fulfil the role of connecting link, it had to be endowed with certain properties perceived as common to both *A* and *B*. In that way development of the image of a scalp as 'the harvest of war' is explicable. The savage, pointless custom of scalp-hunting thus gets a logical explanation applicable to the level of primitive primordial thought.

We would stress once more that there was already a logical mechanism hidden behind primitive, primordial thinking, which had something within it that was common for other forms of cognitive activity, including scientific knowledge. This something in common consists in the linking of two different results brought into opposition through the action of a mediating producer according to the logical scheme 'If *A*, then *B* (through mediator *M*)'.

When we consider the historical process of the development of understanding in its most common form from the moment of the genesis of consciousness to our day, we can notice that it contains degrees whose sequence of rise and change is subordinated to the universal laws of materialist dialectics.

The origin of consciousness is linked with the transition to activity with tools, i.e. with the introduction of a real, and not an imaginary, mediator between subject and object. But because the true nature of the mediator still remained unknown, it was endowed by the strength of imagination with the mysterious properties of a producer. That led to the place of real mediator in the logical mechanism being takeable (and taken) by an imaginary one. The logical scheme 'If *A*, then *B* (through mediator *M*)' is thus employed to explain incomprehensible events without disrupting its integrity. But this is an illusory integrity because the mental link so established may not coincide with the objective caus-

al links. That mode of thinking is characteristic of prescientific forms of understanding (animistic, mythological, etc.).

F.I. Georgiev writes:

> The extremely low level of development of consciousness conditioned by the primitive character of labour forced 'instinctive' man to substitute unsubstantiated notions not reflecting the real link between phenomena for causal analysis of them. The men's successful hunt, for example, is held to depend on silence by the women remaining at home. This 'unconnected link' means that the logical analysis of events was far from always adequate to what actually was.[13]

During the further evolution of practical and cognitive activity there was a return to reality from the figment of the imagination but already in such a form that the objective nature of the causal links was disclosed, and it was demonstrated in practice that the actions of an objectively existing mediator, and not of a fantastic one, led to certain results without the intervention of any supernatural imaginary forces.

As the place of imaginary mediators was taken by real ones it became clear that if there were no really existing mediator between phenomena *A* and *B*, then there was also no relationship between them (like, for example, the absence of an objective relation between a black cat and bad luck for the wayfarer whose path it crossed).[14] This circumstance led to the creation of a new mediating representation that reflected the fact that two phenomena, different from the angle of their connection between themselves, could be in two opposing states: either connected or not connected. The notion of the absence of a connection became, besides, a sort of 'inside out' mediator; the relation of unconnected phenomena began to be reflected mentally as a connection (relation) between them that consists precisely in the absence of any connection between them.

Examination of the process of the transition from prescientific to scientific forms of understanding, as a passage from imaginary to real mediators deserves attention, in our view, and could lead to certain generalisations that are not without interest. The age-old attraction of alchemy, for example, which became particularly common in the Middle Ages, cannot be considered simply as deliberate charlatanry, though there were quite a few enterprising rogues among the alchemists. The alchemists' attempts (often conscientious in the sense that they sincerely believed in the possibility of success) to convert iron scale into noble gold lay in

the common channel of the logical scheme 'If A, then B (through mediator M)'. The role of the mediator here was assigned to the 'philosopher's stone', sometimes called a medicament.

Within the context of our logical scheme expressions of the type 'if a person is ill, then (through the intermediary of a drug) he will become well' or 'if it is iron, then (through the intermediary of the philosopher's stone) it will become gold' appeared quite 'correct'. From the practical aspect, however, the alchemists' attempts to convert iron into gold were attempts to attain a desired goal by useless means. The 'philosopher's stone' was only an imaginary mediator, and in that sense the alchemist mode of thought was similar to the mythical. It was no accident that the real object to which the imaginary mediating role of the 'philosopher's stone' was attached, was endowed with supernatural power, the procedure of 'summoning' it was linked with ritual, magical charms and incantations.

That does not imply that alchemy can be completely reduced to myth. While the mythical mediator was more or less firmly pinned onto some definite imaginary image or external (or cult) object, the imaginary image of the 'philosopher's stone' had rather a symbolical character that in its own way stimulated search for the 'real' mediator among a host of different chemical elements, objects, etc.

Alchemist notions were closely linked with the Christian outlook prevalent in the Middle Ages, which was also permeated with fantastic notions about a mediator. The mythical image of Jesus Christ corresponded, it would seem, to the image of the 'philosopher's stone', the mediator, rather than to the alchemist image of gold as the 'noble and incorruptible' metal. In any case, the image of the god-man had the duality characteristic of the mythical mediator, which enabled opposites to be united mentally, in particular the opposition between the concepts of death and immortality, human and divine nature. Attempts to explain the duality of the image of Jesus (on the one hand god, on the other man) evoked wordy discussions then among philosophers and theologians.

In the christological disputes that developed in the fifth to seventh centuries A.D., the personality of Jesus was interpreted as embodying a 'pure' unity of the divine and human principles that did not, on the one hand, admit of a simple uniting of them, but on the other hand expressed

their fullness and indissolubility 'not through a blending of essences but through the unity of a person'. The duality of the nature of divine personages, incidentally, who had the quality of the sensuous and the supersensuous, the natural and the supernatural, is characteristic of many other religions and mythologies, and not just of Christianity. The secret of this duality and, moreover, its logical inevitability, become clear when we examine the image of Jesus (or of other similar divinities) precisely as an imaginary, mythical 'mediator'.

The mechanism of mentally uniting different events that are not in fact causally connected by means of an imaginary mediating producer plays its role in supporting superstition right to our own day (recall again a black cat, crossing one's path). But the logical mechanism of the uniting of different events by means of a mental operation (hypothesis), so long as it does not embrace the fantastic but an objectively existing relation of the events, has an important place in the development of scientific knowledge. The criterion of the truth of a hypothesis, and its conversion thereby into a scientific theory, is the practical reproduction of the assumed connection between the events predicted by it, or practical confirmation of their happening. The alchemists' surmise of the possibility of transmuting one substance into another has received scientific and practical substantiation in our time. In the USSR, for example, apparatus has been built for producing artificial diamonds from graphite, which was designed and constructed on the basis of knowledge obtained about the structure of chemical elements. It plays the role of a real mediator that makes it possible to transform soft graphite into hard diamond, i.e. the role of the 'philosopher's stone' that mediaeval alchemists sought so unsuccessfully for.

Conviction of the methodological value of mediating representations and confidence that they can reflect the objective existence of mediators which can actually connect contradictory phenomena of reality into some kind of whole are being more and more confirmed in the development of the natural sciences. According to the contemporary notions of physicists, for example, all the interactions of elementary particles are due to intermediate particles that are exchanged between the main interacting particles. These intermediate particles, transferring the interaction, are located for their whole life between the interacting objects on the way

from one to the other. Similar notions underlie the hypothesis of the unity of electromagnetic and weak interactions, whose experimental confirmation would be an important step toward creation of a theory of the possible single nature of all known interactions of elementary particles (strong, weak, electromagnetic, and gravitational). Direct confirmation of a single theory of electrically weak interactions would, in the view of physicists, be the discovery of what are called intermediate vectorial bosons. The fact that the notion of the existence of these hypothetical bosons is not regarded simply as a product of the imagination, to which nothing corresponds in reality, is confirmed by the projected building of huge, expensive experimental installations in which protons will collide with antiprotons of superhigh energies.[15]

So the initial form of logical thought proper was thinking on the principle that 'if *A*, then *B* (through mediator *M*)', which underlay the rules of mental operations in primitive society. This means that logical thought has been dialectical from the start, in the sense that it established a connection between different aspects of reality, united its contradictory phenomena in a whole, and contained a unity of opposites up to and including identity.

The inner contradictoriness characteristic of the mediating representation (that performed the role of middle link in the logical scheme) was overcome in mythologies by the creation of a mentally visualised image whose duality had a more or less visible character. The middle link emerges in the image of a two-faced Janus who simultaneously faced forward and back.

The ancient god Janus in fact represents one of the clearest examples of the mythological mode of mentally 'overcoming' contradictions reflected in consciousness. His name was mentioned in its time in prayers before all other names, as the god of all beginnings, the god of the Sun who was in charge of the opening and closing of the heavy gates through which the sun came out to the earth in the daytime and went in at night. Later not only was the transition from dark to light linked with the name of Janus but also the passage from peace to war, etc. Janus gradually became the god of the entrances and exits of refuges or shelters, and his image was often placed on all doors and crossings.

Mythology did not, and could not, disclose the true nature of objectively existing contradictions. It is nevertheless

obvious that these contradictions were already reflected in this primitive form of thought of the ancients, who tried to overcome them by the means available to them of mentally visualised mythological images.

The constructions of formal logic, which are contained in undeveloped form in the scheme 'If *A*, then *B* (through mediator *M*)', gradually became singled out from the graphic-metaphorical mode of primitive thought. A mediating representation, being essentially the result of all foregoing development of practice and understanding, was an inference, but it was not an inductive conclusion drawn from recurring, directly observable phenomena, although that was also a *sine qua non* of its formation.

Many animals, as we have said, can also observe the heating of stones after sunrise countless times, but they are unable to form the causal judgment 'The sun heats objects it shines on'. Primitive man did not reach that judgment because it came into the head of some one of his animal ancestors, warming himself in the sun to contemplate the azure of the clear, sunny sky or the beauty of the sunrise and sunset. Savages were forced to be quite 'practical' by virtue of vital necessity. They could hardly be numbered among idealist dreamers. They were most likely able to turn their gaze to the celestial luminary, and 'include' it in the sphere of their cognitive activity, only at a comparatively late stage of their differentiation from the animal kingdom, after, in particular, they had mastered the art of maintaining and making fire.

We can fully apply one of Lenin's requirements of dialectical logic to primitive man's forming of notions about the sun, namely that 'a full "definition" of an object must include the whole of human experience'.[16] The judgement 'The sun heats objects it shines on' included a mediating representation corresponding to the level of primitive practice, of the 'vivifying' capacity of the sun to transform darkness into light, cold into warmth, in its periodically repeated movement from sunrise to sunset.

On the socio-historical plane, the evolution of scientific thinking signified overcoming of primitive man's naive way of thinking which was expressed in a metaphorical, mythological form. The basis was thus laid for the hugely important work of ridding thought of mythical mediators. There opened up before scientific thought a prospect of revealing the real, and not imaginary, contradiction between motion and self-

motion. It is well known that the reflection of the movement of concepts in logic is attended with great difficulties, a fact remarked by the ancient Greeks; Zeno's aporias still engage the attention of philosophers and logicians occupied with problems of the reflection of the processes of motion in consciousness.

One can say that the overcoming of these difficulties lay along the path of developing the problems of serious dialectical logic in their connection with the problems of formal logic, while these problems can, in turn, be resolved through the broadest approach to the genesis and evolution of consciousness and knowledge as a natural process conditioned by socio-historical practice. The historically arising capacity to create mediating representations provided the possibility of mentally uniting different phenomena into an interconnected whole according to definite rules given by the initial scheme 'If *A*, then *B* (through mediator *M*)', rather than arbitrarily by a subject just beginning to think. That mental operation already contained the unity and difference of the content and formal logic aspects, and provided the abstract possibility of singling out constructs of formal logic in a self-dependent field of thinking relatively independent of its content. As we showed earlier, the initial logical scheme can be transformed into the syllogism of formal logic or into the implication 'If *M* and *A*, then *B*'. When the mediating representation is 'taken out of brackets', there is a transition to the implication 'If *A*, then *B*', widely employed in modern mathematical logic. But when sight is lost thereby of the historical roots of the genesis of logical thought, it begins to appear that some inexplicable, rationally intuitive lucidity, not determined by anything, underlies formalised logic. Since it is impossible with that approach to say whether the connection of the logical symbols reflects real links and the properties of objective objects, it is at best said to be a 'pseudo-question' lying outside positive science.

In actual fact the answer to the question is that mediating representations, arising historically, by linking the reflection of different phenomena in an interconnected whole according to a scheme of formal logic, gave that scheme a certain content from the outset that reflected (adequately or in distorted form) the really existing contradictoriness of the objective world. The mediating representation, having performed that role, was dissolved as it were in the content of the knowledge generated by it, and 'disappeared' in the

wholeness of the scheme of formal logic. The content aspect of knowledge could now 'be taken out of the brackets' of formal logic, and become a field in which the rational movement of thought was developed in formal logic. That field determines the character of the way of thought at any stage of social development, and forms the starting point of contemplation of the world, and the guiding principles of interpretation of the world, the '*epistemes*' and 'paradigms' that distinguish one vision of the world from another.

The guiding principles fixed in consciousness with time may become so habitual that they are simply not noticed. Consciousness is liberated from them as a matter of course and they pass into the sphere of the subconscious. Something happens similar to what can be observed in the working of a computer. From the logical aspect (but not of the technological) a necessary condition of a computer's faultless working is the development of an algorithm from a mathematical apparatus constructed on rigorous observance of the principle of logical consistency. It may thus be quite forgotten that the machine itself will only work in that case when it is plugged into the mains with their opposite poles ('positive' and 'negative').

To the extent that a notion uniting different phenomena within the framework of some consistent scheme of formal logic is fully incorporated into the content of thought, formal logical analysis may not, with abstraction from the content aspect of thinking, discover its presence in the logical scheme itself. So the illusion is created that an act of imagination, in particular intuitive prevision, expressed in a sudden 'dawning', 'insight', 'guess', has a cognitive structure extra-logical in principle.

The solution of any of these difficult scientific problems really does happen unexpectedly sometimes, like an instantaneous dawning. From the numerous cases confirming that we would take Kekule's discovery of the structure of the benzene ring, which is often cited to explain the ostensibly extra-logical character of scientific discoveries; in fact it proves the opposite. What did Kekule's solution of the problem consist in? All the elements forming the benzene ring analytically revealed were already known to chemists, but they seemed a disordered multitude to the mental gaze, an odd set of elements. The 'rules' of the linear bond between elements then known did not work when applied to the structure of the benzene molecule. What dawned on

Kekule, when he was tackling the problem, was the notion of a ring, of the closed character of the bond between the elements forming the molecule. The idea of a 'benzene ring' was the mediating link that enabled him to pass in thought from a disordered multitude of elements to an ordered one according to the logical scheme 'If *A*, then *B* (through mediater *M*)'. Something similar can be observed in Mendeleyev's discovery of the periodic law. The role of the mediating representation making it possible to unite chemical elements mentally in a certain order was played then by the idea of atomic weight.

Materialist dialectics sees the source of matter's self-motion in the unity and struggle of the opposites included in it. The relations of the categories of dialectics that reflect the unity and struggle of opposites are expounded, moreover, with observation of the rules of formal logic, in a logically consistent form, without permitting arbitrary uniting of any incompatible propositions. It is consequently a matter of seeing the hidden contradiction of the objective processes that are reflected in thought, in order to get logical consistency.

From the dialectical, content-wise angle, formal logic's identification of the object with itself can be thought of as a unity of the opposition of the object to itself up to and including identity which leads to splitting of its unity. The dialectical category of the self-motion of the object includes an identity of the object with itself such that the object is and is not, at one and the same time, and in one and the same relation, in one and the same state, which leads ultimately, by virtue of inner laws, to a change in its qualitative determinacy and to its transformation into another object.

The contradictoriness of self-motion reflected in formal logic could be logically overcome, formally, by the introduction of a formal admission of the possibility of relating the self-moving object with itself as with 'its other', which would appear quantitatively, provisionally speaking, as the identity of equal quantities, but of opposite sign.

At the dawn of human society the development of labour activity with tools had already led to mental differentiation of the various properties and attributes of objects brought out in practice. In particular a possibility developed of identifying and differentiating external objects by their form (e.g. by their sharpness) in relative independence of their material substratum, and of comparing them quantita-

tively by their shape. The prospect was thus presented of abstract operation with formal quantities that seemed quite independent of the relation of the form and content of the really existing objects.

The creation of a mathematical apparatus gave a powerful instrument for human reason's penetration of the mysteries of nature. But with the development of mathematics a gnosiological version began to be spread that the concept of a material world could be replaced by mathematical symbols. The sharp criticism that Lenin made of these views, revived by 'physical idealists' at the turn to this century, is well known; these views again made topical the Kantian idea of the inaccessibility of the material world, which was always doomed to remain 'a thing-in-itself', to knowledge, in particular to mathematical knowledge.

The thesis of the *a priori* character of the foundations of mathematics was expressed quite clearly in Kant's philosophical system. When characterising the concept of a triangle as one of the figures underlying geometrical constructs, he wrote:

> No image could ever be adequate to our conception of a triangle in general. For the generalness of the conception it never could attain to, as this includes under itself all triangles, whether right-angled, acute-angled, etc., whilst the image would always be limited to a single part of this sphere. The schema of the triangle can exist nowhere else than in thought, and it indicates a rule of the synthesis of the imagination in regard to pure figures in space.[17]

One can agree with him that the images of all possible triangles really cannot be fitted into a general concept of a triangle. It is also true that it would have been impossible to create a general concept of a triangle without involvement of the subjective faculty of forming mediating representations, i.e. a capacity for productive imagination. But one cannot agree that a mediating representation is a product of the mind that is not linked in any way with an image of external objects, and that the faculty of creating such notions is an *a priori* one of the subject, appearing from somewhere unknown. (We have shown earlier that the mediating representation has its material determinant, viz., the tool as an objectively existing, and not imaginary mediator between subject and object).

Another of Kant's errors follows from that. While correctly noting that attempts to deduce general concepts

about an object by adding all its possible images together were logically unsound, he drew the mistaken conclusion at the same time that the source of the formation of general concepts lay hidden in a faculty of imagination that had no rationally explicable starting points, and could be only taken as an eternally given faculty of the human spirit inaccessible to understanding.

As a theorist of the natural sciences who generalised the factual data obtained by experimenters, Kant was closer to the truth than Kant, the philosopher, in spite of all the depth and refinement of his philosophical system. His hypothesis of the formation of the solar system through the spontaneous evolution of matter was a great advance toward smashing old ideas about the creation of the world by a supernatural being, or about the immutability of a once and for all established order of observed phenomena. In the field of epistemology, however, Kant not only refused to recognise the existence of the material world's capacity of immanent self-development, but came to a conclusion bordering on solipsism, that order and regularity are introduced into nature by the human mind. The error could have been eliminated through discovery of the natural historical sources of the formation of that very faculty of productive imagination that was later the direct source of the formation of general concepts, i.e. through discovery of objectively determined causal connections leading to the transition from direct sense reflection of reality to its rational reflection.

The credit for discovering that belongs to the creators of Marxian materialist dialectics, who demonstrated that the reason for man's differentiation from the animal kingdom, and his transformation into a rational being, was labour, sensory material activity to transform the natural environment by means of tools. It is in labour that we must seek the cause of the historical evolution of rational thought that led, in its development, to the formation of concepts, judgments, and inferences. The source of the connection between the concept of the object of knowledge and the manifold of its mentally visualised images arose at the time of the genesis of logical thought. That is why attempts to discover these sources in the complex, growing structure of the knowledge attained at a certain level of development of society have proved hopeless, i.e. attempts to regard this structure of knowledge as a 'posited' one. In order to estab-

lish the link of any concept with mentally visualised images, each of which is only a limited representation of the denotation of the concept, it is necessary to start from the features of the formation and development of rational reflection of reality. Such an approach enables us to regard the relation between the concept of an object and the mentally visualised images of it as an interconnected formation.

We have already said that direct sense images become mentally visualised ones to the extent that an idea is already concealed in each sense image, and an idea is seen in a mentally visualised image only insofar as it is a mediating representation whose objective determinant on the plane of the genesis of consciousness was man's ancestors' transition to the use of tools.

That thesis can be extended, in particular, to solution of the problem posed by Kant about the relation of the generalness of the concept of a triangle with the visual images of separate triangles included in it, and to the attempts associated with that problem to substantiate the principles of geometry, since the concept of a triangle has been recognised from the time of Plato as one of the basic geometrical concepts.

There are no doubts about the existence of initial mathematical axioms undemonstrable in the deductive construction of a theory by the means of that theory. As for man's capacity to construct theories deductively, we have already remarked that the creation of new universals, new hypotheses and theoretical conceptions, etc., requires the involvement of a creative imagination which 'grasps', through the creation of new mediating representations, such links between phenomena which are inaccessible to rational thought. The thesis of the *a priori* character of axioms, outside experience, reveals its one-sidedness when we regard it broadly, on the plane of the natural, historical sources of the origin of knowledge in general, and of mathematical knowledge in particular, sources that stem in the last analysis from the formation and development of man's labour and practical activity.

Lenin, when criticising Hegel's views about the figures of Aristotelian syllogisms, wrote:

> man's practice, repeating itself a thousand million times, becomes consolidated in man's consciousness by figures of logic. Precisely (and only) on account of this thousand-million-fold repetition, these figures have the stability of a prejudice, an axiomatic character.[18]

It follows from that profoundly deep remark of Lenin's that the figures of logic owe their origin to human practice; by practice, in Marxist-Leninist theory, is understood primarily labour, i.e. mediated activity with tools, and not the organism's direct relation with the environment. Limitation of the concept of man's practical activity to his direct interaction with the world around him would lead to a subjectivist interpretation of practice as a criterion of truth that itself creates the whole objective world rather than of truth comprehended by man in the process of transforming reality. With that interpretation of practice the figures of logic would be reduced to an expression of the structure of practice itself, rather than to a reflection of the laws and patterns of the external world.

In that connection we must turn once again to the very important point that underlying man's practical interaction with the natural environment there is the mediated, indirect interaction 'subject—subjectivised object—object'. It was the passage to that interaction that put operation of external nature's objective laws at the subject's service and so led to the genesis of logical thinking. The figures of logic, by their very origin, therefore reflect the patterns of the objective world (in one approximation or another to the truth), and not just the structure of man's subjective activity. The structure of practice, moreover, can only be properly understood as the structure of material activity based on man's use of objective laws existing independently of consciousness.

Furthermore, according to Lenin, billion-times repeated practice leads to consolidation of the figures of logic in consciousness; and it is because of that billion-times repetition, and only because of it, that the figures of logic have the stability of a prejudice and an axiomatic character. From that we can conclude that the thesis about the *a priori* character of axioms, outside experience, was a prejudice with the force of habit (according to Lenin) because of an uncritical interpretation of recurrence of the results of practice.

In fact we are already convinced that the formation of concepts of the identity and difference of objects by their shape, for example, in relative independence of their material substratum, had its source in the labour activity of still primitive people. Initially the concept of form, in particular of the pointedness of a tool, could only be of a

very general character; a sharp implement was mentally distinguished from a blunt one. The question of what angle a tool should be pointed by (a more or a less acute one) was posed and decided later in the course of practical use of various tools and implements in accordance with the more or less successful results of their use to achieve definite aims.

We shall not try here to establish the direct genetic kinship of a triangle with the pointedness of a stone tool (though one cannot rule such a kinship out completely). But there is no doubt that before the concept of a triangle arose as a geometrical figure, human society had passed through the stone age. From that time people must have been learning (once more on the basis of practice) to transfer visualised images of spatially three-dimensional objects mentally onto a two-dimensional plane, and to trace out on a plane the more or less straight or bent lines of the contours of the external objects involved in the sphere of their activity (in cave drawings, and so on), finally reaching such a degree of development that the marking out of worked patches of land became an objective, socio-historical fact that required the drawing of boundary lines designating the ownership of sections by one person or another. But, for all that, it is logical to assume that the concept of a triangle as part of a plane bounded by three straight lines was initially only a very general one, inseparable from its mentally visualised image.

One may note, moreover, that the mental drawing of a triangle lies in the general bed of mental operations according to the scheme 'If A, then B (through mediator M)'. In fact, if we consider the operation of tracing two more or less straight lines (and only two) on a plane, how can they be 'joined' to make any whole figure? Such an operation could only be performed by means of a mediator whose representation permeated all primitive thought. The real (and not imaginary) mediator (real in the sense that the operation of finding it could be performed by man's actions in tracing lines on a plane, expressible in mentally visualised images) could have only been the point of intersection of the two lines. So, like the supposed mediator, this point had a 'two-faced', contradictory character; it was at once a point in one line and in the other since the two lines were different. As a result, the geometrical concept of an angle was gradually formed. The formation of the concept of a segment of a line, incidentally, also obeyed this rule. Given two different points in space,

they could be united by the mental movement of one of them along a path leading to coincidence with the other, while remembering the original position of the moving point, which in practice signified the joining of two points on a plane by the tracing of a line. The shortest path in that would have been a straight line. The line also plays the role of mediator here, uniting the given points. It is not difficult to conclude that the formation of the concept of a triangle obeyed the patterns of the same logical scheme, assuming a more broken-down form without loss of the scheme's original wholeness. Given the mentally visualised image of an angle as two different segments of lines with a common point of intersection, and two different points at opposite ends of these two lines, then these last points could also be united by tracing mediator-line. Such a construction of a triangle would initially have had a very general character, independent of what concrete triangle (right-angled, acute, etc.) was so constructed.

Following that road, a mentally visualised image of a geometrical figure can be created, mediated by itself. For that it is necessary to represent a segment of a line limited by points A and B which bends in a circle to full coincidence of the points. In other words, it was necessary to continue tracing the line mentally until it intersected itself at some point; from that one could even attempt to construct a non-Euclidean geometry one of whose axioms would be the postulate that it was impossible to draw through a point on a plane a line continuing in one direction that would not intersect itself. The notion of the point of self-intersecting of a line is already both mediating and contradictory because the beginning and the end of the drawing of the line coincide at it.

To conclude this chapter we must touch on the fact that a theory, constantly coming up against objectively existing contradictions, quite naturally tries to overcome them not in any way it can, not by introducing mythological mediator-images (although attempts may also be made to mythologise phenomena even in our day), but by creating uncontradictory, consistent, formal logical constructs. The contradictions discovered in a theory are removed by creating another of a higher degree of abstraction, one that plays the role of a more fundamental theory in relation to the first. The immense fruitfulness of creating that kind of theory is demonstrated by the whole practical development of human

cognitive activity. One can say that the creation of each more fundamental theory in a branch of scientific knowledge raises the latter to a new level of its progressive development. But from the epistemological angle there is a danger here that may pass unnoticed, especially when the creation of ever newer general theories becomes 'fashionable' in science.

Attempts to create a successive series of theories of a higher and higher order ('super-theories' of sorts, each succeeding the other, that would lead to theoretical generalisation of all theories) are dictated by noble intentions to build a system of logically impeccable theories that would give grounds for saying that a branch of science rested on a foundation of some sort of unique consistent theory. That way, it may escape attention that the elimination of the difficulties in a previous theory (achieved by creating a new one, that alters the content of the old one) leads to the discovery of new difficulties. From the standpoint of dialectical materialism it is quite clear that the sole criterion of the truth of each new theory is ultimately practice, in spite of the certain relativity of this criterion noted by Lenin. The epistemological requirement of caution in evaluating theories is also linked with the fact that the conceptions of defenders of the creation of ever newer 'super-theories' in a branch of science may lead opponents of *a priori* origin of its fundamental concepts to a position of associationism (as a kind of subjective idealist view leading to one-sided, sensationalist, agnostic conclusions on the plane of 'bad' infinity) or the opponents of *a priorism* may find themselves siding, without noticing it, with the defenders of 'super *a priorism*', or Bergsonian or Nietzschean intuitionism (which, as we have seen, has happened more than once in the history of philosophy to the orthodox of a thesis of direct perception of truth 'through the eyes of reason', put forward by rationalists against sensationalists).

The true value of fundamental theory in any branch of science is revealed, in particular, in the fact that, in eliminating the exposed difficulties of the old theory, it produces new ones in the new content of knowledge; the higher the approximation of the new theories to 'the theory of all theories', the internal contradiction of the material world latent behind the outward appearance of things will be reproduced in an ever more 'naked' form. Consistent supporters of dialectical materialism can only welcome this trend, because it

signifies nothing else than a natural historical process of the transition of natural scientists to the only true philosophical positions of dialectical materialism. Marxist-Leninist philosophy, which quite justifiably rejects the title of the science of science, long ago laid bare the objective essence of the process of the reflection of this world by human reason.

Notes to Chapter 6

[1] There is interesting information on this in, for example, Wilbur S. Chaseling's book about Australian aborigines, among whom he lived for many years. See W.S. Chaseling. *Yulengor: Nomads of Arnhem Land* (Epworth Press, London, 1957).

[2] *Filosofskaya entsiklopediya*, Vol. 1 (Moscow, 1960), p. 67.

[3] In his philosophical novel *Les animaux dénaturés* (Editions Albin Michel, Paris, 1952) Vercors faced a parliament with the need to give a precise definition of man, which in the end was given juridical form in the following statute (p. 296):

'Art. I—Man is distinguished from the animal by his religious spirit.

'Art. II—The principal signs of the religious spirit are, in diminishing order: belief in God, Science, Art, and all their manifestations; fetishism, totems, and taboos, magic sorcery, and all their manifestations; ritual cannibalism and its manifestations.

'Art. III—Every animate being that displays any one of the signs mentioned in Article II is admitted to the human community and his person is guaranteed throughout the territory of the Commonwealth by the various stipulations made in the last Declaration of the Rights of Man'.

[4] V.I. Lenin. Socialism and Religion. *Collected Works*, Vol. 10 (Progress Publishers, Moscow, 1978), p. 83.

[5] In his book *Volkerpsychologie. Eine Untersuchung der Entwicklungsgesetze von Sprache, Mythus und Sitte*, Vol. 2. *Mythus und Religion*, Part I (Engelmann, Leipzig, 1900-1909), Wilhelm Wundt, for example, came to the conviction that initially there was a belief in a corporeal spirit inseparable from the body (and not simply in a spirit 'free' of the body). Considering that the concepts of animatism and animism traditionally employed in science to characterise the later views of primitive tribes, when

the initial notions of the inseparability of the 'spiritual' element from the material body had already begun to be lost, he suggested that the term 'archaeoanimatism' be used to designate these initial notions in contrast to the later ones.

[6] From this interpretation of the origin of primitive notions of totems it is obviously impossible to conclude that there is a direct link between the totemic name that an exogamous clan bears, and the inclusion of the corresponding plant or animal in its 'economy' (e.g. palms, sharks, eagles, etc.). But once we recognise the normalcy of the origin of totems as a reflection of the objective process of mastering external mediators in primitive man's consciousness then the later appropriation of a concrete totemic name by a tribe or clan no longer presents difficulty. For since notions of a totem-progenitor were affirmed in primitive consciousness as generally recognised, any primitive community of men becoming isolated in the course of the differentiation of growing society must have appropriated its own totemic name in order to assert its relative independence.

[7] See Michael Cole and Sylvia Scribner. *Culture and Thought* (a *Psychological Introduction*), (John Wiley & Sons, New York, 1974), p. 29.

[8] 'As Vico put it, myths were the first edition of "humanity's mental dictionary" and that reading will last a long time, if not forever. Among the various sophisms of our day, interpreting this gratifying theme in all ways we often have to deal with empty phrases about the inaccessibility of myths, as a special form of consciousness, to logical analysis. From that point of view we can congratulate modern science; after almost a century of sneers about the "savage-philosopher", Lévi-Strauss demonstrated the capacity of savages (*les sauvages*) for abstract thought' (M. Lifschitz. Critical Notes on the Modern Theory of Myths. *Voprosy filosofii*, 1973, 8: 143).

[9] Claude Lévi-Strauss. *Anthropologie structurale* (Librairie Plon, Paris, 1958), pp. 254-255.

[10] E. M. Meletinsky. Claude Lévi-Strauss and the Structural Typology of Myths. *Voprosy filosofii*, 1970, 7: 170.

[11] Claude Lévi-Strauss. *Op. cit.*, p. 229.

[12] See M. Nikolova. The Structuralist Interpretation of Man and His Place in Society. *Filosofskie nauki*, 1974, 2.

[13] F. I. Georgiev. *Soznaniye, ego proiskhozhdenie i sushchnost*

(Consciousness, its Origin and Essence), Vysshaya shkola, Moscow, 1967, p. 53.

The reasons for the wide spread of numerous taboos among primitive tribes on committing certain actions in certain conditions are still a matter of learned discussion. The question should, in our view, be examined as well through the prism of the features of the system of mythological thought. As a matter of fact, at the stage of development of society when the place of the real mediator between the results of at least two events *A* and *B* was still taken by an imaginary one, and the notion of the impossibility of a link between *A* and *B* in the absence of a mediator *M* had already taken shape, it could have been concluded that refraining from actions that were ostensibly linked with the appearance of the imaginary mediator *M* would also make it impossible for event *B* to happen, the result of which would have been undesirable in certain respects for the members of the primitive community.

[14] We have in mind the absence precisely of an objective connection, because, from the subjective aspect, a superstitious person may, on encountering a 'bad omen', suffer a reverse in a contemplated affair because of his own psychic state caused by the omen, i.e. his lack of confidence in the success of the matter.

[15] See: Will Intermediate Bosons be Discovered? Review of reports in the *Scientific American* in *Nauka i Zhizn*, 1982, 10: 81-85.

[16] V. I. Lenin. Once Again on the Trade Unions, the Current Situation, and the Mistakes of Trotsky and Bukharin. *Collected Works*, Vol. 32 (Progress Publishers, Moscow, 1973), p. 94.

[17] Immanuel Kant. *Critique of Pure Reason*. Translated by J.M.D. Meiklejohn (J.M. Dent & Sons, London, 1934), p.119.

[18] V. I. Lenin's conspectus of Hegel's *The Science of Logic* in his *Philosophical Notebooks* (*Collected Works*, Vol. 38), Progress Publishers, Moscow, 1976, p. 216.

7

The Social Premisses of Reason

After our earlier exposition passage to examination of the very important problem of the social character of consciousness may evoke quite understandable objections that this problem should have been given first place then, in view of its key significance, widely recognised in Marxist-Leninist philosophical literature, for exaplaining the origin and evolution of consciousness. Nevertheless our order of developing the theme has been deliberate, and this has solid grounds. The methodological principle of the rise from the abstract to the concrete underlying our study would simply not have allowed us to pass to concretisation of the problems of consciousness connected with its social character without breach of the logical consistency of the exposition. We would note that attempts to deduce consciousness from social relations (though it cannot help having a social character) without preliminary, more or less detailed analysis of man's relation to the external world by the scheme we have adopted of $[S \rightarrow M \rightarrow N]$ (man—humanised nature—nature) would have led in our view to a one-sidedness bordering on incorrect understanding of the basic thesis of historical materialism about the primary nature of social being and the secondary nature of social consciousness. The objectivity of the truth contained in our knowledge of the world consists, of course, in its having a content that does not depend on a person or on mankind as a whole.

On the other hand, the counterposing of relations of the two types depicted by the schemes $[S \rightleftarrows N]$ and $[S \rightarrow M \rightarrow \rightarrow N]$, though it makes it possible to bring out certain spe-

cific features of man's rational reflection of reality in contrast to animals' sensory reflection of it, yield nothing as regards explanation of the features of each separate individual in his relations with other members of human society. People are as like as two peas in them, and the concept of man still has a very abstract, undifferentiated character.

In fact there are no such abstract people in society, any society consists of quite concrete individuals living in certain social conditions; they are either working people or exploiters (in a class society), men or women, representatives of mental or physical labour, children or the elderly, white-faced or black-skinned, snub-nosed or long-nosed, etc., etc., in short, particular persons and not someone else.

Human history is possible, as well, because there are concrete living people each of whom is like someone else but at the same time different from the others. Would not attempts to try and disclose the essence of man as a rational being be mistaken in this connection if they took an abstract concept of man as their initial moment? The question has such methodological significance that we must dwell on it specially.

Attempts to resolve the problem of man that start from denial of the primacy of the individual's corporeal organisation and recognition of the divine immortality of the soul or mind as the basis of human existence are incompatible with a materialist outlook on the world. From ancient times spokesmen of the materialist trend in philosophy have begun their studies of human history from an examination of society as an aggregate of concrete human individuals, and have tried on that basis to deduce certain general principles of the development of society as a whole. Their method of investigation was one of an ascent from the concrete to the abstract; the further they went in their arguments, however, from the living, concrete man taken as the initial moment of the understanding of man in generel, the more one-sided were the results they obtained. Definitions of human essence were getting more and more abstract as a result of these inquiries, and human society itself was depicted, in the last analysis, as a kind of mechanical aggregate of abstract individuals as immutable 'atoms' of a natural human community. The shortcoming of that method was its metaphysical nature. The weak spot in pre-Marxian materialism was not materialism as a system but metaphysics as a method.[1] The development of the method of materialist dialectics by the founders of scientific communism meant surmounting of methaphysical

one-sidedness in the science of human society and man.

Methaphysical materialists, by taking a concrete phenomenon as the initial moment of their studies, could not bring out the general patterns of development of the phenomena considered in their interconnected wholeness. It was necessary to begin from the opposite position, by basing oneself on previously won knowledge, and allowing for newly discovered concrete facts, to re-examine the old theories critically, create new abstractions and new generalisations that would alter the content of the previously developed concepts of concrete phenomena, and then to test the correctness of the conclusions drawn by concretising the generalisation made in relation to subjectively existing concrete reality. That movement of thought from the abstract to the concrete presents a possibility of mental reproduction of phenomena as a certain internally interconnected whole, and not as a metaphysical aggregate of parts built up into a whole lacking inner sources of motion.

Absence of such an approach to study of objective phenomena led even outstanding materialists before Marx to essential mistakes. It is useful here to go into the methodological aspect in rather more detail of one of the direct predecessors of historical materialism, namely Ludwig Feuerbach, because the attitude of Marx and Engels to him, expressed in several of their works, helps bring out more clearly the shortcomings of the metaphysical approach to the problem of man from the standpoint of the old materialism and the radical difference between the dialectical method and the metaphysical.

Feuerbach began his investigation, in his *The Essence of Christianity*, with the 'concrete' essence of man, as he put it. He wanted to deal with the sense object in the form in which it appears in sense perception rather than from a rational understanding of it. He himself said that his philosophy

> has for its principle, not the Substance of Spinoza, not the *ego* of Kant and Fichte, not the Absolute Identity of Schelling, not the Absolute Mind of Hegel, in short no abstract, merely conceptional being, but a *real* being, the true *Ens realissimum*—man; its principle, therefore, is in the highest degree positive and real. It generates thought from the *opposite* of thought, from Matter, from existence, from the senses; it has relation to its object first through the senses, *i.e.*, passively, before defining it in thought. Hence my work, as a specimen of this philosophy, so far from being a production to be placed in the

category of Speculation,—although in another point of view it is the true, the incarnate result of prior philosophical systems,—is the direct opposite of speculations, nay, puts an end to it by explaining it.[2]

While correctly answering the main question of philosophy and subjecting Hegel's idealist system to resolute criticism, Feuerbach at the same time did not make use of the achievements of earlier philosophical thought in developing the dialectical method. The old philosophy, critically reworked by him, was to appear not as the result, but on the contrary as the starting point of his own philosophy.

By beginning his study of society from concrete individuals, Feuerbach was forced, in the last analysis, to reduce men's relations with one another to their natural ones as species relations and so to limit the concept of the essence of man to one of an abstract subject lacking social content. In Feuerbach, Karl Marx said, human essence 'can be regarded only as "species", as an inner, mute, general character which unites the many individuals *in a natural way*'.[3]

Feuerbach could not rise to discovery of the objective laws of the origin and evolution of human society, and remained at an anthropological materialism. Nevertheless this mistaken approach to man on the methological plane was much higher in many respects than idealist conceptions, insofar as it was based on the principle of materialist monism. Feuerbach's materialist positions enabled him to expose the mistaken character of the main premiss in the idealist system of Hegelian philosophy, and to submit the religious, in particular Christian, outlook on the world to well-founded criticism. When analysing religious myths Feuerbach the materialist saw that they had an earthly basis, that features of the real life of men shone through the prism of the fantasy of religious legends, and that the religious world outlook was the result of man's spiritual self-alienation or self-estrangement and of people's notion of their own essence as a spiritual essence separate from their natural bodies.

Feuerbach's attempts to reduce religious myths to an earthly basis, however, could not lead to success. By taking man's 'natural essence' as his starting point, he quite logically, in fact, came to a conclusion about the unnaturalness of man's religious self-estrangement, but did not see why this self-alienation had necessarily come about. Since the causes were not clear to him, his critique of the religious outlook remained passive and contemplative. Not being able to disclose

the objective sources of any social phenomena, the critique could graphically demonstrate its unnaturalness (and that was already an undoubted achievement), but could not show how to eliminate it. The point was, consequently, to disclose the patterns of development of religious self-alienation as the result of social development at a certain stage of history, and then to reconstruct society in such a way that the objective conditions for the rise of an unscientific world outlook, including a religious one, would disappear.

The anthropological principle in his explanation of human essence did not let Feuerbach appreciate, as was necessary, the fact that the material, objective patterns operating in society are reflected in people's consciousness in the form of certain ideas and moral standards, religious ones included. He therefore did not think of men's natural intercourse as intercourse of individuals united as well, incidentally, by a community of ideas reflecting their material position in their society. The essence of man for the individual, according to Feuerbach, was neither the moral creature in him nor the thinking one. It was simply in intercourse or communion, the unity of man and man, a unity that rested simply on the difference between You and Me.

Having brought out the unsoundness of Christian morality's claims to be the sole expresser of the real essence of man, and having criticised idealist attempts to represent human community as intercourse with a religious basis, Feuerbach felt it necessary at the same time to find another basis, for truly human intercourse. But he could not see that it was rooted in the contradictions of men's material life itself, and in their mode of material production. Marx and Engels, when speaking of the essence of man pointed out that

> this sum of productive forces, capital funds and social forms of intercourse, which every individual and generation finds in existence as something given, is the real basis of what the philosophers have conceived as 'substance' and 'essence of man', and what they have deified and attacked.[4]

Being unable to discover the objective basis of human intercourse, and conscious at the same time that the essence of the single individual could not be fully revealed outside his relations with other people, Feuerbach came to the conclusion in the end that a new, truly human religion was needed, one of love, and saw the practical trend of the new philosophy in its including the *essence* of religion in itself when

taking the place of the religion in its being indeed *the true religion.*

Marx and Engels, noting the mistaken character of Feuerbach's conception of man, wrote as follows, in particular, in *The German Ideology*:

> Feuerbach's whole deduction with regard to the relation of men to one another is only aimed at proving that men need and *always have needed* each other. He wants to establish consciousness of this fact, that is to say, like the other theorists, he merely wants to produce a correct consciousness about an *existing* fact; whereas for the real Communist it is a question of overthrowing the existing state of things.[5]

In fact, in actually existing exploiter society, divided into opposing classes, in which the dominant minority lived by appropriating the results of the labour of the overwhelming majority of the masses of the people, preaching of a 'natural essence' of man consisting in the unity of man and man, and in people's naturally always needing each other, then and now, and proclamation of the reasonableness of people's universal, mutual love for one another, could be interpreted as claiming that the worker needed the capitalist no less than the capitalist needed the worker. Such a conclusion fully suits the ideologists of modern capitalism and they often employ it to substantiate the 'justice' of the capitalist system, the need for which is claimed to stem from the eternal, immutable nature of man himself.

Marxism disclosed the objective patterns of the development of capitalist society, in which preaching of 'universal love' is only a hypocritical cover for the existing fact of the exploitation of man by man. Communists do not deny the thesis of people's mutual need for one another, or of their mutual dependence, but scientific communism does not limit itself just to stating that fact. It demonstrates with scientific rigour that it is not the good intentions of mutual love but the struggle of the working class and all working people, based on understanding of the laws of social development, to eliminate capitalist society that opens up real prospects of building a society in which mankind's age-old dream of social equality, and conscious dependence of men on one another, and, if you wish, their mutual love as free members of the rational part of the Universe, become a fact realised in practice.

Attempts to disclose the nature of man as a sensual and rational creature (when the starting point for that is taken

to be some quite concrete human individual, and a 'general' concept of man is then developed by abstraction), thus prove to be quite useless methodologically.

When Marx was working on his main work *Capital* he specially examined the methodological problems of the study, in particular the question of the mode of ascent both from the concrete to the abstract, and from the abstract to the concrete. When comparing the two, he did not come down in favour of the first.

> It would seem to be the proper thing to start with the real and concrete elements, with the actual pre-conditions, *e.g.*, to start in the sphere of political economy with population, which forms the basis and the subject of the whole social process of production. Closer consideration shows, however, that this is wrong.[6]

Consequently, he concluded, it was necessary in science to start, not from the concrete in order to ascend to the abstract but on the contrary, beginning with the abstract to pass to the concrete.

> The latter is obviously the correct scientific method. The concrete concept is concrete because it is a synthesis of many definitions, thus representing the unity of diverse aspects. It appears therefore in reasoning as a summing-up, a result, and not as the starting point, although it is the real point of origin, and thus also the point of origin of perception and imagination. The first procedure attenuates meaningful images to abstract definitions, the second leads from abstract definitions by way of reasoning to the reproduction of the concrete situation.[7]

Recognition of the mode of ascent from the abstract to the concrete as the scientifically correct method of investigation did not mean that Marx in any way recognised abstraction as the starting point of the objective world's development. He criticised Hegel, according to whom the ascent of thought from the abstract to the concrete was the forming of the concrete in actual reality itself, and wrote:

> the method of advancing from the abstract to the concrete is simply the way in which thinking assimilates the concrete and reproduces it as a concrete mental category. This is, however, by no means the process of evolution of the concrete world itself.[8]

The material world existed in all its concreteness before the origin of consciousness and has continued to exist since the latter's origin, independent of it and outside it. The sole initial source of our knowledge of the world, moreover, is sense reflection of it. Logical thought assimilates the concrete,

however, not as the starting point but as a synthesis, as the result of uniting many definitions of the concrete. Lenin's following thesis fully agrees with that conclusion of Marx's:

> From living perception to abstract thought, *and from this to practice*, such is the dialectical path of the cognition of *truth*, of the cognition of objective reality.[9]

Sensory reflection is the precondition of abstract thought both in the general, natural historical aspect of the emergence of man from the animal kingdom, and from the standpoint of the moulding of a child's thinking during its intercourse with adults and the many objects and phenomena that it perceived in the world. Living awareness of concrete reality precedes abstract thinking as well, in the sense that in science the gathering and mental processing of empirical facts often precede the creation of theoretical concepts in time, being a preliminary condition of the passage from one theory to another with a higher degree of abstraction. On the other hand, however, in order to operate mentally with sensually perceived facts according to certain logical rules, it is already necessary to have a faculty for conceptual thought and for abstract reflection of reality. Since we have in mind an already formed man capable of operating with concepts, his cognitive relation to sense data depends on the level of knowledge he has reached during his preceding activity (about which we have already spoken).

Mankind's history takes place in conditions of a natural succession of generations. The knowledge accumulated by one generation is passed on to the next. In order to develop understanding people must first have knowledge of the objective laws gathered by other people before them. The assembled knowledge is embodied in conceptual form. Every concept is already an abstraction separated from the concrete. In that sense the abstract becomes the starting point in thought, and the concrete is the result of the process of further development of knowledge along the path of mental reproduction of the concrete achieved through development of man's material sense activity. In that we leave out, as it were, the circumstance that abstract reflection of reality, in turn, is the result of man's differentiation from the animal kingdom, and the result of men's subsequent joint practical activity, and that of the individual social subject, in understanding and applying the objective laws of reality in all its variety and diversity.

At the same time men are not contented simply with the facts gathered by their predecessors. They turn again to the objective world as an inexhaustible source of new facts. As these facts become accessible to their sense perception, they include them into the existing system of knowledge, 'grafting' the new empirical data (I. S. Narsky) onto previously created abstractions or, if that proves impossible, creating new mediating representations, new abstract concepts and theoretical conceptions, deepening knowledge, and passing the accumulated knowledge on to the next generation. As to the means of passing to the new content of knowledge and the process of synthesising many definitions of the concrete into a whole scientific theory, we have already said enough about it not to have to go into it again.

The accumulating and passing on of knowledge from generation to generation has a socio-historical character; attempts to explain the mechanism of the passage from direct sense reflection to rational reflection by counterposing the two-member scheme $S \rightleftarrows N$ to the three-member one $S \rightarrow M \rightarrow N$ in our view not only does not contradict the thesis of the determinant role of social relations in the moulding of the human personality, but on the contrary is in complete agreement with it, in spite of the fact that the concept of rational man developed at the start of this path was a still extremely abstract one in seeming abstraction from the concept of an aggregate of social relations.

The dialectical materialist conception of society starts from the point that social development is a process of natural history based on objective laws, independent of consciousness. The features of any one socio-economic formation are determined by the aggregate of relations of production constituting the economic structure and real basis of society. Singling out of the relations of production as the basis on which the complex variety of ideological relations arises, and by which it is determined, made it possible for the first time to develop a fully objective criterion for scientific understanding of the historical development of society, put sociology on a scientific basis, and put an end

> to the view of society being a mechanical aggregation of individuals which allows of all sorts of modification at the will of the authorities (or, if you like, at the will of society and the government) and which emerges and changes casually.[10]

But, having established the basic character of relations of production, historical materialism does not limit itself to a

simple statement of the relation between basis and superstructure. It points out, moreover, that the basis itself is subject to the effect of the forces of production, and that the productive forces and relations of production, being two different aspects of social life, have a certain dependence on one another.

The productive forces, very generally defined, materialise the interaction between man and nature as a perpetual and natural condition of human life. They include (1) people who transform nature through their labour in order to adapt natural objects to their wants, and the instruments of labour, above all tools, that they use to produce vitally necessary material goods.

The interaction of the productive forces and the relations of production as two aspects of material production, which constitutes the basis of social development, is governed by the general sociological law of correspondence of the relations of production to the character and level of development of the productive forces. The relations of production, which constitute the economic basis of the whole aggregate of social relations, are the social form of the development of the productive forces and play an active role in the latter's development only to the extent that they correspond to the objective needs of growth of the productivity of social labour. Otherwise they become fetters holding back further growth of the productive forces, and the interaction of the two aspects of material production sooner or later, but with socio-historical inevitability, leads to a social revolution, and to replacement of the old relations of production by new ones under the pressure of the more mobile, revolutionary side of material production, viz., the productive forces. After that there is also a revolution in all spheres of the forms of social consciousness.

We have recalled these truths of historical materialism, well known to every educated person who is acquainted with the fundamentals of Marxist-Leninist sociology, simply in order once more to bring into relief the methodological expediency of using, as one of the initial premisses for disclosing the theme of our book, the analysis of the relation 'man—humanised nature—nature', in which the determinant member is taken to be the tool.[11] Our opposing of the three-member scheme, symbolically expressed by $S \rightarrow M \rightarrow \rightarrow N$, to the dyad $S \rightleftarrows N$, had the aim, in particular, of abstracting the productive forces as far as possible from the

relations of production as a special aspect of material production consisting in man's relation to his physical environment mediated by tools, i.e. as an aspect that, while inseparable from the relations of production, is not reducible to them. To some extent, this abstracting also embraces the relations of production conceived as the aggregate of men's material relations with one another independent of consciousness and formed, of socio-historical necessity, in the course of the production and distribution of material wealth. But the concept of the relations of production enters the three-member scheme in a still undeveloped, undifferentiated form.

Indeed, by the first term of the triad $S \rightarrow M \rightarrow N$ we understand not some concrete, individual, but an *aggregate* man in the sense that the concept 'man' is a species concept on the logical plane here, and not a specific one. By man's activity mediated by tools, therefore, we have essentially understood the joint labour of socially producing men. That use of the concept 'man' is justified, in particular, when describing men's relations with one another in primitive society, in respect of which it is still impossible to speak either of the formation of a definite personality as a social phenomenon or even more of the division of people into classes.

Frederick Engels, when pointing that out, gave the following description of man in the tribal system:

> The tribe remained the boundary for man, in relation to himself as well as to outsiders: the tribe, the gens and their institutions were sacred and inviolable, a superior power, instituted by nature, to which the individual remained absolutely subject in feeling, thought and deed. Impressive as the people of this epoch may appear to us, they differ in no way one from another, they are still bound, as Marx says, to the umbilical cord of the primordial community.[12]

We may also recall here the following statement by Marx: 'man proves himself a conscious species-being, i.e., as a being that treats the species as its own essential being, or that treats itself as a species-being'.[13]

It will readily be noted that the concept of man adopted as the starting point of our study, as a species one from both the logical and the historical aspect, is diametrically opposite methodologically to the premisses of metaphysical materialists who, by beginning their studies from an examination of concrete individuals, finished them by developing an abstract, species definition of man as the 'inward, dumb genenerality which *naturally* unites the many individuals'.[14]

In following Marx's method of investigation, which consisted in advancing from the abstract to the concrete so as thereby to reproduce the concrete through reasoning, we must obviously concretise the initial species concept of man, and come to him as a member of a certain social organisation as part of a system of men's relations with one another in the course of their life activity.

The business of concretising the concept which we have represented symbolically by S in the scheme $S \rightarrow M \rightarrow N$, brings us back as well to the need to concretise the concept represented by the same symbol in $S \rightleftarrows N$. Human society, as a certain whole characterised by the aggregate of men's relations with one another, could not have arisen from nothing. The specifically human forms of intercourse must obviously have been built up as man became differentiated from the animal kingdom, and have had their natural, historical preconditions in forms of intercourse that already existed among our unreasoning ancestors.

The transition from direct sense reflection of reality to its rational reflection, which we have already examined, required preliminary acquaintance with certain general features of the sensory world of animals, since it would have been impossible to 'build a bridge' from the former to the latter without characterising them when we approached the problem of the origin of consciousness from the angle of natural history. So we disengaged ourselves from the very important circumstance that by S in the interaction $S \rightleftarrows N$ must be understood not a specimen of some species of animal taken separately, but a certain aggregate of the individuals making up that species, and finding themselves in vitally necessary intraspecific relations. Having, for brevity's sake, designated the host of the animals of this species entering into interactions with one another by S: $(s_1, s_2, \ldots s_{n+1})$, we can say that the dyad $S \rightleftarrows N$ in fact contains the relation S: $(s_1, s_2, \ldots s_{n+1}) \rightleftarrows N$, which includes the intraspecific relations of the individuals included in S.

That means that we must make a very substantial amendment to what we said earlier about the sense reflection proper to animals, an amendment, moreover, that relates to the deepest sources of this reflection. It is a matter, first of all, of the instinct for self-preservation as an expression of a striving to preserve its integrity built into the animal organism. The absence of such a striving in them would lead to their life being impossible. But any one specimen taken separate-

ly is unable permanently to resist operation of the law of entropy: sooner or later it will die, so that, if the instinct of self-preservation (for all its 'blindness') were reduced simply to the individual's striving to maintain its own life, the species would simply die out. Continuation of the species' life is achieved by the succession of generations, which calls for the reproduction of progeny. The instinct of self-preservation, consequently (while an expression of the integrity of the separate individual) must of necessity include a striving to continue its kind, to reproduce offspring, i.e. the sex instinct.

The evolution of life led to a bifurcation of the single tree of life, and to its greater and greater ramification, including differentation of branches of highly organised species with a division of the sexes within them. But the dialectic of life is such that without the intercourse of individuals of opposite sex belonging to a species, without their meeting each other as their other, this branch of the tree of life would not yield fruit and would be doomed to die out. That fatal doom is very abstract and improbable, of course, if it is intraspecific relations, that are meant, provided we abstract the conditions of the species' environment and habitat or, rather, provided that the state of the environment is presumed to be wholly conducive to continued reproduction of the species' life.

Given that condition there is no fatal dooming of life in practice even at the level of its preconscious form, because (1) life has preserved a possibility of asexual reproduction of species in some of its branches, and (2) the individuals of species with division into sexes are not represented simply by a single pair. In that case the life of individuals that have no offspring will be continued in other individuals of the species without danger of its extinction. The origin and evolution of human society led to a transformation of the relations of the individuals forming the species *Homo sapiens*, to a change in the external natural conditions themselves, and so on. We shall not touch here on the ecological problems that agitate those of the scientific public who think about the future of humankind in our age of scientific and technical revolution. For the purposes of our theme we would simply note that, with the development of rational reflection, the sex instinct could not help undergoing qualitative transformations, providing the basis for the gradual establishment of an elevated feeling of the love of men and women, a feeling

that is one of the generally recognised sources of creative inspiration.[15]

The important fact for us here is that the link between individuals of different sex of the species S: $(s_1 \rightleftarrows s_2)$ must, as a necessary condition of continuation of its existence, have been the 'initial' cellule of intraspecific intercourse for species or organisms with division into sexes, a link dictated by the instinct of self-preservation (which includes the sex instinct). In highly organised animals the instinct to continue life is not simply reducible to the sex instinct, but also consists in care for the growing offspring and its training for independent life. In the course of the struggle for existence evolution also led to the rise of more or less permanent communities of individuals belonging to a species, in which a necessary condition for prolonging life was gregarious living (which increased chances in the struggle with dangerous enemies, in protecting the life of progeny, and so on). Among animals living a gregarious or herd way of life, the instinct to preserve life is manifested in an instinctive sense of gregariousness.

The instinctive sense of self-preservation thus got a more or less differentiated form among highly developed animals in the course of evolution. The animal's programme of instinctive behaviour is also supplemented and corrected by experience gathered during its life and developed on the principle of the formation of conditioned reflexes. But for all that, the instinct of self-preservation retains its wholeness, reflecting the inner wholeness of the individual organism as a self-regulating system. The herd made up of individuals has no other material substratum of the reflection of reality than the bodily organs of each of the individuals belonging to it, with their sensory apparatus, nervous system, etc.[16] Differentiation of the wholeness (unity) of the instinct of self-preservation, connected with the animal's conditioned behaviour, therefore does not abrogate the thesis that the direct source of the wholeness of the animal's perception of external phenomena is the wholeness of its organism.

The herd is a more or less stable entity, a system in which each separate individual can be regarded as an element of the whole. Observations of the way of life of gregarious animals indicate that the herd is a system with a more or less strictly observed structural organisation that includes a certain division of functions among the members of the community, a hierarchy of subordination, and so on. The relation

of each separate individual to the environment, while remaining to some extent direct, is already mediated now by the relations within the herd of the individuals constituting it.

The joint activity of the herd (as a certain whole of the individuals forming it), evoked by living necessity, gets the form, at the level of sense reflection, of an information link between its individuals. This link is realised through gestures, postures, secretion of odorous substances, sounds, etc., that have the character of signs or signals. As the structural organisation of the herd, and the relations both of the herd as a whole and each of its members with the environment became more complicated, so, too, must the system of information signals.

In the scheme $S\ (s_1, s_2 \ldots s_{n+1}) \rightleftarrows N$ information signals can be divided into at least the following groups: (1) signals that carry information about relations between the individuals forming S, and (2) signals informing about events in the herd's environment. The first group includes signals about the feelings of inner needs experienced by individuals (e.g. the male's call intended for the female, the hunger cry of the young, and so on), and signals connected with preservation of the herd's structure as an integral system (e.g. the leader's threatening posture on the appearance of a rival making claims to a higher status in the herd hierarchy). The second group includes signals about an external danger threatening the members of the herd, about finding food, and so on. Analysis of the intraherd information link leads to conclusions that are interesting in many respects (a few of which we shall touch on here).

The division of functions among the herd's members leads, in particular, for example, to one or more members of the herd being on the look out for the external situations dangerous for it, while the other members are freed of this need and get the chance to go quietly 'about their business', which can be interrupted by a danger signal from the sentinel, who functions in relation to each separate member as an intermediate link between it and the environment. The role of intermediate link between the young and the environment belongs to the parents, in particular, in the herd mode of life, and to the older generation in general. Until the members of the new generation achieve independence, the parents (older generation) are their direct source of obtaining the external material and energy resources needed to support

life (e.g. food), and at the same time the source of vitally necessary information about events in the external world, which is passed on from generation to generation.

Allowing for that, let us return to examination of the relationship $S \rightarrow M \rightarrow N$ characteristic of rational beings (men). There are grounds for supposing that man's ancestors led a joint, group form of life. The anthropoid apes of the end of the Tertiary Period that were his direct ancestors, like most modern primates, jointly exercised such vitally important functions as the gathering of food, defence against predators, etc.[17] Man's labour had a collective character from its very genesis, so that the definition of social animal is quite applicable to primitive man.

Our simplified scheme $S \rightarrow M \rightarrow N$ can now be depicted in differentiated form as follows: S: $(s_1, s_2, \ldots s_n) \rightarrow M$: $(m_1, m_2, \ldots m_n) \rightarrow N$. The relation of each separate individual to the environment is mediated here both by its relations with other individuals forming the society and with humanised nature. That qualitatively alters the information link between the members of the society. While with the connection $S \rightleftarrows N$, information signals carried information about a direct sensually perceived fact, expressed the emotional state of the animal uttering the signal, or were signals for the action of the individuals constituting S, with $S \rightarrow \rightarrow M \rightarrow N$ a signal carries information in addition about actuating the inner forces latent in mediator M. A sound signal, or some other, bearing information about the guess about the self-movement of M arising in the brains of hominids, became printed in a new, second signalling system, the first act in the origin of human speech. The signal became a word, signifying a concept.

Having mentally 'penetrated' into an external thing M, man (as said above) also 'penetrated' mentally into his own inner world. Through naive spiritualising of objects of the environment he identified the environment with himself, on the one hand, but on the other, differentiated himself from the environment as a special, active, 'spiritual' force. The transfer of his own activity S to the self-movement of M was accompanied with a reverse transfer of the self-movement of M to the self-action of S. The force actuating mediator M is not a mediator but the first subsystem in the system $S \rightarrow M \rightarrow N$.

With transfer of the relation $S \rightarrow M \rightarrow N$ to the field of men's relations with one another other mediations became

possible, viz. $\dot{S}_1 \rightleftarrows (\dot{S}_2 \rightarrow \dot{M}) \rightarrow \dot{N}$, $(\dot{S}_2 \rightarrow \dot{M}) \rightleftarrows \dot{S}_1 \rightarrow \dot{N}$, $S_1 \rightleftarrows S_2 \rightarrow M \rightarrow N$, $S_2 \rightarrow S_1 \rightarrow N$, etc. The character of the information signals controlling men's interaction was correspondingly altered. Just as their physical efforts which produced result R_a actuated tool M, and R_a was only an intermediate result on the way to R_b, the information signals of men's joint activity, divided in separate functions, performed the role of trigger for performance of an intermediate operation by part of the group, or by its separate individuals, while at the same time carrying information about the expected end result of the whole group's activity.[18] It is much to the point to recall here what Engels said:

> First labour, after it and then with it speech—these were the two most essential stimuli under the influence of which the brain of the ape gradually changed into that of man.[19]

Without a transition to use of mediator-tools in the conditions of the joint activity of forming men, a 'need to say something to one another' could not have arisen in them. The origin and development of language are inseparable from the genesis and development of human society.

The division of functions between the parts of a group in the course of joint activity led to men's becoming each other's mediators in the sphere of their relations with one another in their common interaction with the environment, playing the role of a kind of 'tool'. When, for instance, some of the primitive community performed the function of beaters during a hunt, the result of their operations did not in itself coincide directly with the aim of the hunt; on the contrary it was directly opposed to it. The beaters, instead of catching the object of the hunt, frightened it away. They achieved only an intermediate result; the final result, coinciding with the aim of the hunt, fell to the other part of the community lying in ambush. The condition of successful organisation of the hunt was that the hunters had already 'grasped' in their heads the unity of the opposition of R_a and R_a as a unity and difference of means and ends.

The possibility of extending mediated relations to the field of men's relations with one another, i.e. social relations, signified an abstract possibility of converting one part of society into a tool to achieve the purposes of its other part. That this possibility became reality in time is demonstrated by the facts of the passage of society through the slave-owning socio-economic formation. Slaves, as is well known, were put on the same social footing as other tools, and were simply a

means for satisfying the needs of the class of slaveowners. The conversion of this possibility into reality, however, was not due to biological laws, but to the qualitatively different laws of the development of human society.

We would also draw attention, within the context of this chapter, to the following aspect of our problem. Since the role of mediator M may not only belong to objects of animate and inanimate nature differentiated from S but may also be performed to some extent by the individuals constituting S in relation to one another, does it not follow that there are forms in the animal kingdom of our planet in which a mediated relation to the environment like $S_1 \rightarrow \rightarrow S_2 \rightarrow N$ arose in the course of evolution?

If that is so, we could suggest the hypothesis that these animals have a faculty of reflecting reality not only at the direct sensory level but also at a level approaching man's reflection of it. In fact relations of the type $S \rightarrow M \rightarrow N$ and $S_1 \rightarrow S_2 \rightarrow N$, in spite of their difference, have a common aspect along with it that can be the basis in certain conditions for passage to a more complex level of psychic reflection of reality.

This hypothesis, of course, requires the support of facts, which may be discovered in the course of further study of the way of life of highly organised animals. As regards dolphins, for example, there is evidence that they have a herd mode of life, and a division of certain functions within the school, with a lively exchange of information between the individuals in a 'language' still not comprehensible to people, and that the dolphin brain is highly developed, etc. But can dolphins act according to the scheme $S_1 \rightarrow S_2 \rightarrow N$ in just the same way as is characteristic of the mechanism of interaction $S \rightarrow M \rightarrow N$ considered above? We still do not have enough scientific evidence for a comprehensive answer.

The main difficulty, apparently, as follows from our exposition, is to clarify whether a faculty could be formed in dolphins (or other animals) of 'using' one another mutually as a mediating link in relations with the environment in such a way that psychic 'objectification' of space/time relations in their brains would become possible, and on that basis an ideal reflection of the unity of the various results formed along the lines of 'If A, then B (through mediator M)'. We can limit ourselves here again simply to the hypothetical supposition that relations connected with the peculiari-

ties of the reproduction and training of progeny as a necessary element of continuation of the species' life in the specific conditions of a herd ('social') way of life could have played a substantial role in establishing such a faculty.

But, however it was, the practical power of human intellect, in spite of the supposed community of principles of the formation of thinking beings, cannot be compared in any way with the psychic capabilities of other highly developed animals, if only because man uses a very broad range of objects and forces of the environment as the mediating factor, including inanimate nature, which is inaccessible to the other living creatures inhabiting the earth.

Along with development of man's practical and cognitive activity, the real causes of the inner forces of interaction latent in nature were disclosed; primitive man's naive spiritualising of natural objects gave way to a scientific explanation of the operation of objective laws, and myths yielded place to science. The working man was and is the primary productive force, because it is he who creates, by his labour, and brings into operation, the whole aggregate power of the instruments of labour that society disposes of at any stage of its development. But whether it is a matter of a simple spade or of a striding excavator, man does not affect the object of labour directly, but through a tool. It is the tool, as the material embodiment of the knowledge gained by him of the operation of objective laws, that performs the role of the direct force acting on the object of labour.

The transition to labour with tools that determined the transition from ape to man, laid the basis at the same time for the rise of human society. As Engels wrote:

> a new element ... came into play with the appearance of fully-fledged man, namely *society* .... And what do we find once more as the characteristic difference between the troupe of monkeys and human society? *Labour*.[20]

The rise of human society was the factor without which, and outside which, the specifically human forms of passing on and accumulating experience of man's cognitive and transforming activity from generation to generation, would have been impossible, and without which, in turn, the development of the separate human individual, too, as a rational creature capable of reflecting reality in ideas, would have been impossible.

We shall pass to an examination of the problems of the social character of human experience in the next chapter.

Notes to Chapter 7

[1] As to the different meanings given to the term 'metaphysics', see note 4 to Chapter 1.

[2] Ludwig Feuerbach. *The Essence of Christianity.* Translated by George Eliot (Harper & Row, New York, 1957), p. XXXV.

[3] Karl Marx. Theses on Feuerbach. In Karl Marx and Frederick Engels. *Collected Works,* Vol. 5 (Progress Publishers, Moscow, 1976), p. 4.

[4] Karl Marx and Frederick Engels. *The German Ideology.* (Progress Publishers, Moscow, 1964), p. 50.

[5] *Ibid.*, pp. 57-58.

[6] Karl Marx. *A Contribution to the Critique of Political Economy* (Progress Publishers, Moscow, 1977), p. 205.

[7] *Ibid.*, p. 206.

[8] *Ibid.*

[9] See Lenin's conspectus of Hegel's *The Science of Logic* in his *Philosophical Notebooks* (*Collected Works,* Vol. 38), p. 171.

[10] V. I. Lenin. What the 'Friends of the People' Are and How They Fight the Social-Democrats. *Collected Works,* Vol. 1 (Progress Publishers, Moscow, 1977), p. 142.

[11] The material form of fixed capital does not consist solely of tools, but also of other implements of labour (production buildings, canals, roads, etc.). But since tools have a definite role in the means of labour, we have referred exclusively to them for sake of brevity. This is all the more justified, because Marx, when speaking of other means of the labour process, stressed that 'these do not enter directly into the process' (*Capital,* Vol. 1. Translated by Samuel Moore and Edward Aveling. Progress Publishers, Moscow, 1974, p. 176).

[12] F. Engels. *The Origin of the Family, Private Property and the State* (Progress Publishers, Moscow, 1968), p. 98.

[13] Karl Marx. Economic Manuscripts of 1844. *Collected Works.* Vol. 3 (Lawrence & Wishart, London, 1975), p. 276.

[14] Karl Marx. Theses on Feuerbach. Translated by Roy Pascal. In Karl Marx and Frederick Engels. *The German Ideology.* Op. cit. p. 199.

[15] The formation and development of relations between the sexes in human society has been the subject of many disputes from ancient times to our own day. Engels paid

much attention to it in his *The Origin of the Family, Private Property and the State.* In spite of the fact that this question goes far beyond the limits of our theme, I would like to draw attention to some elements that have a direct bearing on it. It has been found that one of the most important attributes of the primordial clan was the custom of exogamy, i.e. a ban on marital relations within the clan. The reasons for the commonness of this custom among primitive tribes are far from clear, but several different hypotheses have been advanced (see A. I. Perschitz, A. L. Mongait, and V. P. Alexeev. *Istoriya pervobytnogo obshchestva* (History of Primitive Society), Vysshaya shkola, Moscow, 1974, pp. 74-79). When this matter is examined as an aspect of the initial logical scheme 'If *A*, then *B* (through mediator *M*)', we can suggest that the custom grew up in the common channel of the features of reflection of reality in mythological thought. The transition to mediated conceptual reasoning required the involvement of a certain mediator to unite the different sides of reality, laying a ban on their direct, unmediated union. Since the differences between the sexes had already found reflection in primitive consciousness, the rules for the 'joining' of the opposite sexes in a marital union were not, it would seem, an exception. In any case the origin of notions of a dual organisation consisting of a combination of only two exogamous groups fits fully into the rules for creating mediating representations in general. The notion of the marital union of two exogamous groups *A* and *B* comes close to fulfilling the role of imaginary mediator *M* in relations between the sexes. The union, by performing the role of intermediate link *M*, provided the opportunity to establish an interconnection between each woman of group *A* and each man of group *B* in full correspondence with the rules of logic of the primitive way of thought, even when the notion of marital union related to notions about fantastic mediators. The retention of imaginary fantastic mediators for the mental establishment of a connection between phenomena that in fact have no mediating character continues to serve as a source, albeit in transformed form, of the persistence of superstitions down to our own time.

[16] It must be noted that there was nothing supernatural about the evolution of life leading to the formation of certain entity of individuals that had, in addition to individual

organs for perceiving, storing, and processing information, another special 'collective' organ of a similar kind, whose material substratum is the whole aggregate of the individuals themselves operating as individual, specialised cells of a single organism. Such views have been expressed, for example, about the bee family. There would have to be some sort of material substratum as well in any form of such 'telepathic' connections, however, if such actually existed, as their vehicle, uniting the aggregate of the separate individuals into a single whole.

[17] See A. I. Perschitz, A. L. Mongait, V. P. Alexeev. *Op. cit.*, p. 39.

[18] Use of the second signaling system to regulate the joint activities of the members of a primitive collective group went hand in hand with mental transfer of the triggering action that the word had on people as well to objects of the environment. That also followed from people's naive animistic identification of external objects as 'inspired' beings. It is possible that the roots of the origin of every kind of magical incantation, and primitive belief in the supernatural force of the word, capable of 'moving mountains', are hidden in that circumstance.

[19] Frederick Engels. *Dialectics of Nature* (Progress Publishers, Moscow, 1976), p. 174.

[20] *Ibid.*, p. 175.

8

What Is 'Experience'?

One can say, without fear of exaggeration, that there is no trend in the history of philosophy in any way significant that raises problems of the relation between the sensory and rational elements in knowledge, which has not linked their solution with unfolding of the concept of experience. As our book is devoted to just those problems, we are justified in attempting a special examination of the character of the content embodied in the concept of experience.[1]

Despite the diversity of definitions in the literature (the aggregate of sensations and perceptions fixed in memory; direct contemplation of the object of knowledge; an aggregate of abilities, habits, and skills; exploratory experimental activity; the ways and means of practical or cognitive activity; the functional invariant of a self-regulating system, etc.), we may note that most writers who make a special examination of the problems of experience their business, or who just touch on them in some connection or other, are agreed at least in one respect, namely, in defining the place they give to experience. This place is the field of man's relations with the world around him or, when it is limited to the epistemological aspect, to the relation between the knowing subject and the object of knowledge. The very fact of his relating experience to that field puts us right in the middle of the acute struggle that has been waged for centuries between the two opposing camps in philosophy, i.e. between materialists and idealists. 'We know from the history of philosophy,' Lenin wrote, 'that the interpretation of the concept "experience" divided the classical materialists from the

idealists.' [2] Since this concept relates to the description of relations between the understanding and the understood aspects, exposure of its content depends on a correct position when answering the basic question of philosophy.

When materialists consistently defend the monist principle of the primacy of matter and the secondary character of consciousness, they conclude that man understands and employs objective laws, independent of consciousness, in his practical interaction with the environment, and that the experience accumulated during this interaction not only has a subjective character but also includes an objective content independent of consciousness. Advocates of idealistic monism, in spite of the many, often substantial divergences between them, consider that some ideal substance underlies the universe and that the aim of knowledge (when it is at all accessible to any extent to people) is understanding of the spiritual basis. The position is not altered in principle in that respect whether the basis is personified, or is thought of as an impersonal absolute idea, or is represented as some undefinable subject that 'constructs' all the rest of the world from its Ego.

The repeated attempts to reconcile these two opposing philosophical views that have been made with the best intentions, and have made claims to impartial scientific analysis, have inevitably ended in failure, and will continue to do so. We know from the history of philosophy that they have been undertaken, in particular, in the form of a counterposing another starting point to the monist outlook of both materialists and idealists, that recognises the existence of two principles rather than one at the basis of the universe, namely, material and ideal. But the dualist (or pluralist) philosophical conceptions have not stood up to criticism, revealing an inherent, inner lack of co-ordination and a logical inconsistency when explaining phenomena of nature, society, and thought.

Materialist monism has been attacked from other positions as well. The offensive acquired a particularly broad scale at the turn of the century, and has continued down to our day, regardless of the defeats suffered. Its adherents are united by views that have both class and epistemological roots. A characteristic feature of it is an attempt to replace the philosophical categories of matter and consciousness by a category of experience, advancing it epistemologically to the foreground.

As the sphere of the subject of understanding's relations to the object experience is often made an absolute to the extent that not only is the epistemological opposition of the categories of matter and consciousness explained as superfluous, but the parties of the cognitive process, subject and object, are often merged and disappear from the field of view. Spokesmen of this trend examine only the sphere in which subject and object are directly in contact. They claim, moreover, that this opens up a possibility of constructing philosophical systems that are superior to materialism and idealism, and that the monist views of materialists (and for sake of 'objectivity' those of frank idealists) are replaced by a 'philosophy of experience', or some more perfected 'neutral' monism. Employing Bertrand Russell's graphic comparison, we can say that experience in this sense is like a razor that has been honed so much that nothing is left of it.

Lenin gave a brilliantly penetrating and theoretically deep criticism, in his *Materialism and Empirio-Criticism*, of attempts to replace the category of matter by that of experience in its Machian sense, and showed that the interpretation of experience as 'a set of sensations', in spite of the use of new words, was only a rehash of old subjective idealist themes and that claims to have created a 'median' line in philosophy meant to take over from materialism and idealism were in fact attempts to confirm the dominance of philosophical idealism under a 'neutral' flag.

What Lenin said about Machists is still of incontestable value in the struggle against the latest forms of idealism that disguise themselves under various fashionable labels. Along with frank, undisguised anti-communism (the main weapon of imperialist propaganda), philosophical works still have a leading place in our ideological opponents' arsenal that develop the idea, in the guise of overcoming the one-sidedness of both materialism and idealism, that the basic theses of dialectical materialism are either outmoded or in any case dubious. There are now not so very many open adherents of 'pure' idealism among modern Western philosophers who want to be taken seriously. On the contrary, most of those who are recognised authorities in the development of present-day Western philosophical thought, very likely consider it too superficial or simplified to class their philosophical systems as idealist, though many of them do not object to classing them as realist, and themselves moreover count their conceptions as realist. Western philosophers do

not, as a rule, accept the principle of dialectical materialism that the main grounds for classing any thinker in a certain philosophical trend is primarily his attitude to the basic problem of philosophy.

Lenin drew attention to the fact that the word 'realism' was soiled by positivists and other muddleheads who wavered between the materialists and idealists. In order to be counted an adherent of certain 'realist' theories, it was considered sufficient to recognise the existence of any ideas, concepts, experiences, etc., as independent substances. Since any fallacy, illusion, dream, or statement is given to us in our consciousness, it can be interpreted from that standpoint as no different in principle from objects and processes of the objective world that exist outside and independent of consciousness. The very unwillingness of many Western philosophers to be classed as idealists is quite symptomatic, and is indirect confirmation of the influence of the ideas of dialectical and historical materialism on the development of society. In the age of mankind's passage from capitalism to socialism, and in the period of rapid development of science and engineering, frank idealism is losing its effectiveness in many respects in the struggle against a scientific, materialist world outlook.

When we have the epistemological aspect of the matter in mind, the concept of experience used to be treated in the Soviet philosophical literature mainly in studies aimed at criticising the idealist employment of it. The number of works devoted to the special problem of experience was very small. That was due, to some extent, to the concept of experience (and of realism as well) having been discredited by philosophical schools hostile to Marxism-Leninism. That, however, did not mean that little attention was paid in the Soviet literature to phenomena related to the sphere of experience. Its problems were examined, for example, and still are, on the plane of bringing out the content of the category of practice.

There are certain grounds for this approach. In Marxist-Leninist philosophy practice, of course, is given a decisive place as a criterion of truth, and as the basis, source, and aim of knowledge. Practice, like experience, belongs to the sphere of man's interaction with the world around him. But the close intermingling of the concepts of practice and experience that stem from that still does not mean that they are identical. The view that they reflect different though inter-

connected aspects of man's transforming and cognitive activity, is more correct. Further study of the problems of experience in the general theory of knowledge still presents interest because it can lead to a deepening of views of the category of practice in its dialectical materialist understanding.

We do not operate with the concept of experience simply in the theory of knowledge, of course. It has a significant place in sociology and other sciences. The experience of the socialist revolution in Russia, which laid the basis for practical realisation of the ideal of a truly just society, and the experience of building communism in the USSR and other countries of the socialist community have enormous significance for the nations of the whole world.

Further study of the problems of experience in connection with its role in understanding the laws of the evolution of nature, society, and thought, and refining of the concept 'experience' of the idealist distortions compromising it, so that it would occupy its place in the strict system of dialectical materialist epistemology, are of the greatest theoretical importance, in our view, the more so because Western ideologists are employing this concept today to give their philosophical conceptions an appearance of objectivity and impartiality.

On the historical and philosophical plane problems of experience have usually been treated together with those of the interconnection of the sensory and rational aspects of knowledge. That frees us from any need to make a further digression into its history, because all the antinomies of empiricism and rationalism, which seemed insurmountable for metaphysical materialism and various forms of idealism, can be fully extended to solution of the problems of experience when we tackle the question of the interconnection of the sensory and rational aspects of knowledge.

We must remember, however, that idealist absolutising of the sensory aspect of knowledge led to conceptions of subjective idealism that reduced the whole material world to elements of sense experience (Bishop Berkeley, David Hume, Ernst Mach, Richard Avenarius, pragmatists, and some contemporary neopositivists). In his definition of experience John Dewey, for example, in spite of his attempts to dissociate himself from extreme forms of subjective idealism, came essentially to conclusions that coincided completely with Avenarius' thesis about the 'principled co-ordination of the Ego and non-Ego'. Dewey invested the

concept of experience with a content that blurred the difference between matter and consciousness. He wrote that there was no need to oppose experience and nature, sense data and things, subject and object, consciousness and matter, the psychic and the physical, and that experience

> denotes both the field, the sun and clouds and rain, seeds, and harvest, and the man who labors, who plans, invents, uses, suffers and enjoys. Experience denotes what is experienced, the world of events and persons; and it denotes the world caught up into experiencing, the career and destiny of mankind.[3]

His final conclusion thus contained a tautology: experience was defined through experience. One can fully apply the words Lenin addressed to Avenarius to such a definition: 'Experience is experience. And there are people who take this quasi-erudite rigmarole for true wisdom!'[4]

Making the sensory aspect of knowledge an absolute does not save one from subjective idealist errors in interpretation of the concept of experience, even when collective, socially organised experience is taken as the starting point for it, rather than the experience of the single subject taken separately. A. A. Bogdanov made such an attempt, considering the concept 'socially organised experience' a fundamental one of philosophy.[5] He continued to develop that point of view with certain inessential reservations even after the appearance of Lenin's *Materialism and Empirio-Criticism*, in which the conception was subjected to sharp criticism as subjective idealism.

What was 'socially organised experience' in distinction from individual experience? Bogdanov replied as follows. When a single subject identified objective reality with what he saw and heard in a given case, he might be mistaken. But if other people said to him: 'Yes, we see and hear what you do', i.e. if his experience and theirs agreed, were socially organised, then he was dealing with real objects and objective physical phenomena. If, on the contrary, they said that what he asked about did not exist for them, then it was clear that his experience was only 'subjective' in that case, only psychic, an illusion or hallucination.[6]

The fallaciousness of Bogdanov's initial positions, which was rooted in an idealist solution of the main question of philosophy, put its stamp on his subsequent development of the conception of 'universal organised science', which he called 'tectology'. His subjectivism showed itself, in particular, in attempts to put the 'universal organised

science' (whose founder he considered himself to be) above philosophy in general and Marxist-Leninist philosophy in particular.

The Communist Party of the Soviet Union, guided by the theory of scientific communism, attaches enormous significance, we know, to the scientific organisation of labour and scientific organisation of the national economy. The very possibility, moreover, of scientific guidance of social development, according to Marxist-Leninist theory, can only be realised insofar as it is based on understanding of the objective laws of social development, which are independent of consciousness, and on the practical replacing of capitalist social relations by socialist ones that open the road to planned, proportional development of the economy free from the spontaneous upheavals inherent in the economy of monopoly capitalism. 'Socially organised experience' in Bogdanov's sense, had nothing in common with the position of historical materialism about the objective character of the operation of the laws of social development. History provides many examples of views shared by an absolute majority of people that ultimately turned out to be false, and not to correspond with objective reality. Suffice it to mention the views of the earth accepted at one time as an immobile flat surface.

Interpretation of the concept of experience from the standpoint of idealist rationalism has proved no less mistaken. In that connection we would dwell in rather more detail on Hegel's approach to the definition of experience, because it was the first attempt to unfold this concept from the standpoint of the dialectical method. Hegel's views on experience were most fully expressed in his *The Phenomenology of Mind*, which Karl Marx called 'the true point of origin and the secret of the Hegelian philosophy'.[7] Hegel himself called the phenomenology of mind the science of experience of consciousness.[8]

The objectively idealist point of view that Hegel based his system on, and both the weak and the strong sides of his method, also completely affected his development of the concept of experience, which he deduced from the movement of consciousness. Consciousness set itself an aim that it strove to attain (viz., knowledge). In the course of realising its aim it discovered that the result achieved did not coincide with the proposed aim, and that knowledge of the object differed from the object of knowledge. From that there followed a need to compare the desired results with

those obtained, to correlate knowledge as the set aim with the result of the knowledge attained. According to Hegel, this process, inherent in consciousness, took place without any outside interference, without training, instruction, or other help.

From each such comparison consciousness emerged different than it was initially, and altered its subject matter; it moreover believed that the object of knowledge existed outside consciousness and independently of it, but this belief did not correspond to the truth because, in fact (as Hegel thought), the understood object was consciousness's own object. But since consciousness did not know about that, the comparison was made unconsciously, consequently the change in its point of view, and the rise of its new subject matter, also proceeded unconsciously. That continued until consciousness finally discovered that the object of knowledge was its own knowledge of the object. This transformation of views about the object as a process of comparing the desired with the attained also constituted what Hegel called experience.

> This *dialectic* process which consciousness executes on itself—on its knowledge as well as on its object—*in the sense that out of it the new and true object arises*, is precisely what is termed *Experience*.[9]

Instead of seeing the subjective reflection of objectively existing objects in this category, Hegel himself converted them into moments of consciousness. He regarded man's real, practical, transforming activity as spiritually abstract, and took the development of concepts for the development of objective reality itself. He therefore, in spite of a number of profound remarks, came on the whole to an incorrect definition of experience methodologically, as well as regards content.

Attempts to reduce human experience exclusively to direct sense experience, or to the experience of consciousness, contradict the materialist outlook on the world. But, right down to the rise of Marxism, the materialism that preceded it could not bring out the essence of human activity, and at the same time of human experience. Francis Bacon, the great English materialist, for example, employed the concept of experience to fight scholastics in order to develop the inductive method of knowledge. He compared dogmatists who denied sense experience, and arrived at their systems by speculation, figuratively to spiders, and their systems

to spiders' webs. At the same time he saw the unsatisfactory nature of reducing experience simply to sense perception of facts. He called advocates of pure empiricism ants, and the results of their studies anthills, in which various facts were piled up higgledy-piggledy. For him the real scientist was like a bee, who not only gathered nectar from flowers but also converted it into honey. At the same time, he himself understood experience even more narrowly as experiment, observation, a 'trying' of nature.

When the eighteenth century French materialists analysed man's relation with the external world, they assigned a great role to experience. Diderot, for example, wrote:

> We have three principal means: observation of nature, reflection, and experience. Observation gathers the facts, reflection combines them, experience verifies the result of the combination.[10]

Although he stressed its practical direction in this definition of experience, he understood it even more narrowly as experiment. The French materialist enlighteners could not bring out the social, historical character of practice.

Feuerbach's approach to the description of experience was also not wholly consistent. While exposing speculative philosophy, which separated consciousness from the sensory, material basis, he at the same time did not understand the transforming role of man's practical activity, and exaggerated the significance of direct sensory activity as genuine truth in a one-sided manner.

N. G. Chernyshevsky came very close to a dialectical materialist conception of the practical side of activity and its connection with the sensory and intellectual sides.

> Practice (he wrote) is the great exposer of deception and self-deception not only in practical matters but also in matters of feeling and thought.[11]

Karl Marx, speaking of the difference between his own theory and the views of preceding materialists, wrote:

> The chief defect of all materialism up to now (including Feuerbach's) is, that the object, reality, what we apprehend through our senses, is understood only in the form of the *object* or *contemplation*; but not as *sensuous human activity*, as *practice*; not subjectively. Hence in opposition to materialism the *active* side was developed abstractly by idealism—which of course does not know real sensuous activity as such.[12]

Men are not passive contemplators of the world around them. Without their subjective real activity, directed to

mastering material and energy resources of the environment so as to maintain and prolong the life of the human species, mankind could not exist. Underlying human activity is labour, mediated activity in the course of which men come to an understanding and application of the objective regularities and patterns of the environment. The individual, moreover, is not an isolated subject but a social being who belongs to a certain socio-economic formation.

Since man's subjective activity has an objective content, his subjective experience must also have such. Experience is possible because it is objective laws, independent of consciousness, that man knows and applies. Lenin criticised Plekhanov's mistake, which took the form of an uncritical attitude to the definition of experience given by the empirio-critic Carstanjen as an object of investigation and not a means of knowledge, since the object of knowledge could not have an objective content.[13]

The thesis of the objective content of experience is generally accepted in the Soviet literature. But since the task of drawing a distinct line between the concepts of experience and activity has not been posed, the term 'experience' is used in various senses, signifying one aspect or another of activity or characterising socio-historical practice as a whole. In fact, however, people distinguish the following three moments of experience, in spite of all the variety of its aspects: (1) it is sensuous activity, because man is part of the animate world; (2) it functions as practical activity, labour, mediated by objects; (3) it is the activity of man as a being capable (in contrast to animals) of conceptual thought, as a subject possessing a certain stock of knowledge. It is used, respectively, in three senses in the main, in accordance with the aspects of activity mentioned above: (1) sense experience; (2) practical experience; (3) experience expressed in the aggregate of accumulated knowledge (which can be arbitrarily called theoretical knowledge). Other senses of the term (observation, experiment, skill or practical knowledge, everyday experience, etc.) are only derivatives of these main meanings.

The use of 'experience' in various meanings is quite justified, since it refers to the really different properties and relations of the object of investigation signified by the word. The subject of a statement may have various predicates, but when we are talking about the different properties and relations of one and the same object (in this case experience),

then the broader definition, embracing all the previously expressed partial definitions in a general form, is just as justified. If there is sense experience, practical experience, theoretical experience, we can speak of experience in general, experience 'taken out of the brackets', experience in the broad sense of the word. In that case the term will describe man's attitude to the objective world as that of a sensuous subject capable of practical activity and possessing consciousness. In order to signify the unity of the sensuous, practical, and theoretical moments of experience, of course, we could introduce some other term, but the word 'experience' quite successfully reflects all these moments taken together.[14]

Since human activity has a mediated character, this character must be carried into human experience. We said above, that the passage to labour meant the development of the tool as a mediator between man and the environment, which is an objective determinant governing the rise of a subjective faculty for creating mediating representations, and so the transition from direct sense reflection of reality to rational reflection of it. The mediating link is an inner contradiction containing a unity of opposites.

The contradictoriness of human activity, incidentally, is that man himself, on the one hand, makes changes in the environment by his physical efforts and the operations of his organs, and on the other hand actuates mediator objects that are not natural organs of the human organism and that affect natural objects in accordance with their characteristics reflected in the human brain in ideal, conceptual form. People perform mental operations in addition to bodily ones. The former consist in the formation of concepts, and in operating with them according to certain rules. Man's activity is thus a certain unity of bodily, physical, and mental actions. In other words, subjective human activity is, on the one hand, sensuous, material activity, practical activity directed to external objects as ones opposing the subjective Ego; on the other hand, it is mental, cognitive activity without an ounce of matter in it (in the sense, for example, that there is really not an atom of matter in the concept 'food' capable of satisfying the natural need for food).

The unity of the sensuous and rational aspects of human activity thus functions here as a unity of its practical and cognitive sides. While the practical aspect of activity as

a process of the subject's interaction with the environment finds outward expression mainly in the transformation of external objects, the mental, cognitive aspect is outwardly objectified in language. Accordingly specifically human experience is outwardly objectified in two main, opposite forms that can be called concrete and abstract.

The *concrete form* in regard to productive activity is 'humanised' nature, i.e. all the objects, forces, and processes that are transformed by labour and put to man's use. Man cannot thereby abolish or alter the objective character of the laws of nature, but he can only create conditions whereby these laws, which exist independently of consciousness, operate in a direction needed by him and lead to desired results. This can also be called the object form. In the whole variety of the world of objects that man has surrounded himself with, tools, the principal 'humanised' object mediating his relations with external nature, occupy the main place.

The concrete form has a qualitative determinacy. The quantitative difference functions here as a quantity of a certain quality. We can make 100 standard lathes, for example, or 1000 more or less identical microscopes, and so on. But any lathe will differ from any microscope precisely in its qualitative definiteness, even when both are made of the same materials; a microscope will not cut metal parts, and you cannot see very small objects invisible to the naked eye through a lathe. Qualitative determinacy consists in an endless number of concrete forms, each possessing only its inherent quality, and incapable of being commensurated from that aspect with any other.

The *abstract form* of the objectifying of experience is a sign system, language. In contradistinction to the concrete form the abstract one is characterised by its quantitative determinacy; the qualitative difference functions here as the quality of a definite quantity. Knowledge of the laws of the creation and operation of various machines, instruments, etc., can be expressed in the sign system in spite of the fact that they have a host of concrete forms.

As the abstract form of the objectification of experience, language is not only the means of people's living intercourse but is also the storehouse of accumulated knowledge, the concentration of information. Language, considered from the angle of the form of expression of experience, has a universality as regards the concrete means of its manifestation,

and is treated here as language in general. From that aspect, it is a matter of indifference, as regards a certain piece of knowledge, whether it is formulated, at the moment it is expressed, in Russian words, or English, or those of some other specific language, in the language of figures, or of blueprints, or of the coded tapes used in computers. Language, as an abstract or universal form of expression of experience, consequently has only one property, which Marx and Engels called the direct reality of thought, practical, real consciousness.

We would also note that language is treated here not from the standpoint of the national form of culture (which is also very important), but precisely as the abstract, universal form of expression of experience. If different languages did not contain this moment of universality, it would be impossible to translate from one into another. We would be unable, moreover, to decode the writing found in excavations, of ancient, extinct nations whose language disappeared long ago. This property of the universality of language contains an objective possibility of forming a single universal language of world communist society in the more or less distant future.

By being objectified in concrete and abstract forms experience acquires an independence in relation to each person but, having become real for other people, it also becomes real for the individual subject and is manifested as an inner property of the individual. Experience must therefore be regarded not only in the forms of the object but also subjectively.

While the concrete form of experience is displayed outwardly in objects made by man, it is expressed subjectively in the human organism's capacity to perform certain bodily operations so as to transform objects of external nature into objects made by man.

As man became differentiated from the animal kingdom through labour, his physical organisation itself was perfected, in particular his hands as specifically human organs for the performance of these operations. This faculty can be called mastery or skill.

The subject's capacity to retain concepts expressed in language in his memory, and to perform mental operations, corresponds to the external, abstract form of experience, i.e. language. In contrast to the concrete form of his experience, which can be put into the words 'he knows how',

the universal form will correspond to the words 'he knows', and his capacity itself, in this respect, can be called knowledge. From the subjective aspect experience is defined as a unity of both these elements, i.e. a unity of ab lity or skill and knowledge.

While the concrete and the abstract forms of experience are outwardly a unity of opposites, from the internal, subjective aspect they are an interpenetrating identity of opposites: viz., ability (skill) is defined through knowledge and knowledge through ability.

Ability (skill) is practical knowledge of things, isolated knowledge of how to perform a concrete operation, knowledge limited by the bounds only of the object. Being limited by the object, ability (isolated knowledge) logically negates itself as knowledge in its development, because it has nothing more to know than the object it already knows. Knowledge of the concrete logically appears in this moment as ability from which knowledge has been dialectically sublated.

But in negating itself as knowledge only of a concrete object, knowledge is thus liberated from the shackles of the object binding it. Here we have the negation of the negation, the transition of knowledge or a concrete object to knowledge of another concrete object.

As a result knowledge of the concrete now appears as the possibility of concrete knowledge of a host of objects each of which differs qualitatively from the others. This logic of the dialectical development of ability is only the subjective reflection of the real relation of the subject to the object, a relation that really exists in every person's everyday life.

Since ability as isolated knowledge is limited to the context only of a given concrete operation, the process of the activity in which it is realised is a constant repetition of this operation. Ability functions here as a definite skill, as the art of performing this operation acquired in the course of the repeated activity. During its perfection knowledge of the concrete is more and more dissolved, and the skill is transformed into a habit.

Habit, as a property of the subject, is an ability from which knowledge of the concrete is dialectically sublated. Acting by habit a person performs a certain operation automatically, as if consciousness were asleep, switched off as regards the habitual course of the action. Consciousness awakes here when the habitual course of the action is dis-

turbed, but is switched on then precisely because the habitual has ceased for some reason to be habitual. Everyone knows that feature of habit from his own experience.

For a worker, stationed, for example, at a conveyor belt, to be able to screw on a required part, he must know how to do so in practice. Constantly screwing on one and the same part during the movement of the conveyor he becomes skilled in performing the operation, which develops into a habitual action. He begins to screw the part on automatically, without making any mental effort.

The concept of habit is contradictory. It contains in itself, on the one hand, the sublation of consciousness, the possibility of converting a person into an automatic appendage of a machine, and on the other hand, the possibility of freeing consciousness from the confines of a given operation shackling it, and of passing from knowledge of one object to knowledge of others.

The habit of performing a certain operation frees the worker's consciousness of the need to control each movement of his hands. While working at the necessary speed he can listen to music, think about things that have no direct relation to his operation, and so on. He is thus mentally freed from the oppressive monotony of his activity without harm to its results, but that liberation is only an illusory freeing of consciousness from the narrow confines of the given concrete operation. It contains the possibility in itself of passing from knowledge of how to perform the concrete operation to new knowledge of the concrete, but in an abstract form.

The fact that such a liberation of consciousness can take place in man himself has very important, practical significance in life. If man were unable, through habit, to divert his attention from conscious control of each of his purposive acts during his activity, his mental capacities would be almost wholly expended on performance of those movements. A pianist, for example, would have to give all his attention to knowing how, at each moment, to place one finger and not another on a certain key. Such a player would never rise to inspired mastery of execution, and would always remain at the level of a beginner.

Ability (know-how) is thus determined as an aspect of experience, from the subjective standpoint, through knowledge of a concrete object. The object is treated subjectively as the activity of an individual limited by the context of

a definite concatenation of movements, while knowledge appears as the subject's capacity for a given concrete activity, for performing a certain range of bodily, physical operations.

The liberation of consciousness through habit from the narrow confines of a concrete operation contains in itself a transition from know-how as individual knowledge of a given concrete object to another isolated knowledge, to knowledge of a multiplicity of specificities, each qualitatively different from the other. This transition contains a possibility of inferring general knowledge inductively from isolated knowledge, and determining knowledge through know-how. *Knowledge* is 'abstract' know-how, ability to operate with concepts, the aggregate and content of which have been given to man by his preceding phylogenetic and ontogenetic development.

In the process of reasoning the subject establishes a link between concepts as his own concepts, and comes to conclusions that he considers true. At that point know-how negates itself in general as ability, because it knows how to do everything that it knows and there is nothing more for it to know how to do. The truth achieved at that stage of rational subjective activity is formal, final truth. Knowledge is then manifested as dogma, is closed in on itself, and rejects any new phenomena going beyond the confines of the abstract truth achieved.

But since truth is final truth here, further development cannot help leading to its negation *qua* truth. Knowledge—'abstract' know-how—is emancipated from formal truthfulness in that negation. It passes into concrete know-how, which no longer contains the truth as formal truth, but as actual truth. This dialectical, logical transition contains a subjective reflection of the real fact of the transition from abstract thinking to practice in the course of which new knowledge is obtained that is employed in turn for the further development of practice, and so on.

Take, for example, the architect. When designing a building he creates his mentally visualised image of it. By making the necessary calculations he satisfies himself about the correctness of one of the variants, and the future building is given expression in symbolic form, in blueprints, specifications, etc., as a completely finished structure. But this structure is only completed verbally. Any number of such buildings can be built mentally, but actually erected buildings will not be got thereby, and the correctness of the calcula-

tions made will not be confirmed in practice. The architect's confidence in the correctness of his calculations must be embodied in practical erection of the designed building. When it is built, people will be convinced of the validity of the project, and get practical experience of erecting such a structure, on which they will be able to rely when designing a new, better building.

The unity of skill or know-how and knowledge with the former reduced to habit and the latter to formal truth can be called everyday experience or ordinary common sense. Some writers are inclined to reduce the whole concept of experience to just this one moment of it. Such an interpretation is given, for example, in the book of the American positivist Philipp Frank, *Philosophy of Science.*[15]

The level of knowledge and mastery attained by society at a given level of its development is socially consolidated in everyday experience. It is that which constitutes both its great strength and its weakness. It bears the stamp of conservatism; taken by itself it means the end of development, and endless marking time in one place. What seems habitual and true from the angle of everyday experience reveals its incompleteness in the course of further understanding and practical use of objective laws, and is a deceptive appearance that does not correspond with the facts of new experience. Karl Marx aptly said of this, in connection with the description of the laws of economic life that he had discovered:

> This seems paradox and contrary to everyday observation. It is also paradox that the earth moves round the sun, and that water consists of two highly inflammable gases. Scientific truth is always paradox, if judged by everyday experience, which catches only the delusive appearance of things.[16]

In the course of the development of knowledge we discover not only the incompleteness of earlier established notions but also their erroneousness. The contradiction of everyday experience lies in its reflection in concepts of positive and negative experience. The latter is not reducible to mistakenness as such, or to ignorance. In this case experience is not a mistake or ignorance but knowledge of the mistake and ability to avoid it.

While the abstract form of the expression of experience outwardly functions in the form of language, it is subjectively expressed in man's capability of creating concepts and operating with them. Just as the organs of man's body were

perfected in the course of his historical becoming (in particular his hands as a specifically human organ for performing physical acts), so the nervous system, too, was perfected, in particular the brain as a specifically human organ for performing mental actions.

In the same way as know-how leads in its development to new knowledge, so the development of knowledge leads to new know-how. Truly human activity is that in which experience is realised in a unity of ability and knowledge, i.e. in a unity of the concrete and abstract aspects. This is as much object activity as rational activity. If all the people composing a society concentrated exclusively on the object side of activity, the society would lose its human property. The people would be turned into robots, into an ant-like crowd of unthinking creatures producing and reproducing one and the same set of objects with an automatic rhythm. On the other hand, a society could not exist, all members of which concerned themselves exclusively with mental activity, because they would produce nothing except their own thoughts in that case.

In society, regarded as a single whole, there are always the object and mental sides of activity in their unity. The activity in which the concrete aspect of experience is realised appears as material or *physical* labour. The external object of such labour is the production of material things, and the subjective object, perfection of the organs of the body, mainly the hands, and of certain operations to alter the external object. The activity in which the abstract aspect of experience is realised is spiritual, or *mental* labour. The external object of this labour is the word, language as the direct activity of thought, while the subjective object is the creation of concepts and operating with them.

When society is regarded as a whole, and only one sphere of its activity is taken (true, the main one, viz., the production of material wealth), the objective laws present themselves as laws of nature external to man, while man's relations with nature in the process of understanding and practically employing those laws are part of the definition of the productive forces of society. Experience is manifested here as a unity of a certain sum of knowledge and a certain level of know-how realised through the joint labour of people. Experience finds its expression in this activity in the workers' degree of mastery and their skills in performing the labour operations, on the one hand, and on the other, in

corresponding knowledge of the process of labour activity that they perform.

Specifically human qualities acquired as a result of centuries of development are concentrated and preserved in experience. The material wealth produced by man for consumption in fact ends its life together with consumption. Food is eaten, clothing wears out, coal is burned, raw materials are converted into a finished product that, in turn, is also consumed in one way or another. Even machine tools, structures, housing become useless with time and drop out of further use. This whole 'world of commodities' is constantly arising and disappearing, and will, endlessly, while mankind exists. The individual, too, is not eternal; time passes and he dies. The old generation gives way to a new one. But human experience lives eternally and is developed in the human world.

In his *Theories of Surplus-Value* Karl Marx summarised as follows the view of Ricardo's follower, the English economist and publicist, Thomas Hodgskin, who defended the interests of the proletariat and criticised capitalism from a standpoint of utopian socialism:

> ... the accumulation of the skill and knowledge (scientific power) of the workers themselves is the chief form of accumulation, and infinitely more important than the accumulation—which goes hand in hand with it and merely represents it—of the *existing objective* conditions of this accumulated activity. These objective conditions are ... nominally accumulated and must be constantly produced anew and consumed anew....

He then commented:

> The whole objective world, the 'world of commodities' vanishes here as a mere aspect, as the merely passing activity, constantly performed anew, of socially producing men. Compare this 'idealism' with the crude, material fetishism into which the Ricardian theory develops in the writings 'of this incredible cobbler', McCulloch, where not only the difference between man and animal disappears but even the difference between a living organism and an inanimate object. And then let them say that as against the lofty idealism of bourgeois political economy, the proletarian opposition has been preaching a crude materialism directed exclusively towards the satisfaction of coarse appetites.[17]

That was written more than a century ago, but Western ideologists still continue to ascribe a fetishisation of things to Marxist theory foreign to its spirit.

The satisfaction of material wants is the first condition, without which human life itself is impossible. But what

liberation of man can there be if he is not emancipated from the daily threat of being left without food, clothing, shelter, and other vitally necessary material goods. The creation of a surplus of commodities, however, is not an end in itself, but the real foundation for building a society in which the all-round development of each becomes the condition for the development of all. Communist society is not a 'consumer' capitalist society, the vices of which have become the subject of special sociological research in recent years.

The accumulation of experience must also be regarded from the angle of the succession of generations, since mankind's social and historical development proceeds through their natural replacement. If the experience accumulated by each generation died with it, and were not passed on to the next, mankind could never have become differentiated from the animal kingdom, since each new generation would have been forced to begin all over again. The moment of the passing of accumulated experience is of definite significance for describing the historical continuity in the development of society.

On the other hand, the following generations, inheriting the experience accumulated before them, make their own contribution to the further development and accumulation of experience. The process is an essential moment of social progress. One can imagine that further accumulation of experience might cease for one reason or another, in some stretch of history, other conditions being equal, but the established forms of passing on already amassed experience were preserved. In that case society's development would also stop at that point, although the continuation of life as the natural succession of generations would go on with its former rhythm. Mankind would be forced, in that event, to revolve in a closed circle, and the natural replacement of generations would lead at best to numerical growth of the population and a corresponding increase of tools in their old types.

The facts of history, however, indicate otherwise. Each new generation begins with what has been acquired by its forerunners. It takes over their experience and then, on the basis of the experience passed on to it, develops experience further, now very slowly, now with increasing speed, and accumulates it, broadening and deepening knowledge of objective laws, and organising and perfecting their practical application, and discarding one way or another all the old

ideas that have proved incompatible with the objective content of the new experience.

Mankind's movement along the road of knowledge and practical use of objective laws can be compared figuratively with the ascent of a steep mountain peak. Persistent people cut step after step in the hard granite, climbing higher and higher. Each new step is the support for making another, higher one. New people and new generations, following on one another, climb the prepared steps cut in the granite to their highest point, so as to continue the ascent, cutting new steps.

Specifically human experience is not passed on biologically from parents to children. That is quite convincingly shown by the facts known to science, when small children grew up through tragic circumstances without communion with other people. At the end of the eighteenth century the great naturalist Carl Linnaeus, basing himself on the information then available, had differentiated a special suborder of 'wild men' in the order of primates, to which he assigned children abandoned in early childhood and who had grown up in solitude in the forest or had been fostered by animals.

More than 30 cases of the finding of 'wild children' are now known, of which more than 20 were raised by animals (wolves, bears, and even a she-leopard). All the children found among carnivores ran on all fours only, ate raw meat, did not display any habits of work, did not make use of even the simplest tools and did not make them, did not know how to talk, and did not possess human reason. The same state has been observed in children who have grown up in solitude in the forest.

Here is an attested example from the literature. In 1920 two girls aged three and eight were found in a wolf's lair near the town of Midnapore in India. The younger was baptised Amala, the elder Kamala. Amala died, not surviving life among people for a year, Kamala lived another eight years.

For around nine years the Indian Anglican priest, the Rev. Singh, kept a daily account of Kamala's behaviour. In the first days of their stay in the orphanage, the girls howled wolflike at regular intervals and made attempts to return to the jungle. Their eyes shone in the dark, like a wolf's. They ate raw meat without using their hands, seizing bits with their mouths, crunching bones, and lapping

water. After Amala's death her older friend refused food and water for two days. It took several years to teach Kamala to walk upright. Almost no results were achieved in developing speech. After the first four years she had learned only six words; gradually her vocabulary increased to around 100 words. She died at 17 years of age, having achieved the mental development of a four-year-old infant.[18]

The character of Mowgli, created by Rudyard Kipling, in spite of the entertainment of the narration of Mowgli's adventures, has nothing in common with science. In order to master work skills, and to know how to talk and think, in other words, in order to possess all the qualities that distinguish man as a thinking creature from the rest of the animal kingdom, it is not enough, though necessary, to be born in the physical image of man. The human organism, it is true reveals an amazing adaptability in these cases to changes, and non-human conditions of the environment, and astonishing receptivity to the habits and whole way of life of their unthinking 'teachers'. But, as will be seen from the example cited, this is achieved at a very dear price.

At the same time this fact is evidence of the advantages of man's biological structure, and its higher organisation, in which there are possibilities absent among animals. It is well known that the training of an animal in a human environment, although it yields palpable results, cannot raise the beast to the level of man's rational activity.

The branch of pedagogy concerned with the training and upbringing of blind and deaf-mute children has put very valuable scientific material at our disposal relating to the mechanism of the transfer of human experience from generation to generation.

The first boarding school in the world for children deprived of sight, hearing, and speech (which was opened in Zagorsk, near Moscow, in 1963) has achieved results remarkable as regards their scientific and practical significance. Its pupils acquire the faculty, after the course of training, of conversing by touch, and of reading and writing in the Braille alphabet. The standard of mental development in the top classes is such that pupils master the volume of knowledge of secondary school and are ready to enter a college; some of them are even ahead of fellow students who studied in ordinary schools in depth of education in several fields of knowledge, and have successfully continued studies in higher educational institutions.[19]

The Zagorsk school's experience indicates that children who are fenced off from the outer world by a barrier through which neither light nor sound penetrates, and are cut off, it would seem, from the main sources of information about their environment (except the senses of smell and touch), are capable, unlike physically healthy children raised by animals of becoming fully fledged personalities. But that requires human experience to be passed on to them by other people through extremely meagre channels of communication with the world around them.

The results of the education of blind deaf-mutes allow us to draw conclusions that substantially supplement the information known to science about the raising of children by animals. Exclusion from an environment of social factors consisting of specifically human forms of mutual intercourse leads to the impossibility of forming a human personality. On the other hand, limitation of the environment almost exclusively to the social factor makes it possible to obtain remarkable results in the development of specifically human capacities, and opens access to spheres of human activity and moral and aesthetic values even for children deprived from birth of the most important biological channels of communication with the environment.

The essence of man thus necessarily includes in itself the experience accumulated and preserved by other people, going back into the depths of the history of successive generations, and transferred to him. The transfer and accumulation of experience cannot be directly explained by the laws of heredity and variability operating in living nature. Other means, unknown to the animal kingdom, are required for its transmission, and other 'vectors' of heredity are needed. And there are such specific carriers; they are a unity of the two opposing forms of experience that we have spoken about above.

The presence of 'vectors' of this experience alone is not sufficient for the act of transmission to be effected. It is necessary for one generation to establish relations somehow with another, and in addition each succeeding generation must have a vital need to receive experience. Given these conditions, transfer of experience can take place as an inevitable process. As for the relations of the successive generations, the existence of a real 'fathers and sons' link evokes no doubts as a natural fact of the reproduction of progeny. The living need for the progeny's take-over of experience

accumulated before them also really exists as a necessary condition of continuation of the human species, though it has to be explained on another plane.

Each new generation is forced to accept the tools passed on to it by its predecessors, and to ensure their operation, otherwise production of the material goods needed to maintain its life would stop. It is therefore also forced to adopt the experience accumulated by forerunners as regards practical activity, whether it wants to or not. But this means that each new generation must, at the same time, take over the stock of knowledge of objective laws, and of the conditions of their application, which is expressed in linguistic form.

The process of the passing on of accumulated experience is thus realised with natural inevitability; it is inherent in human society and is an objective process of the continuation of society's life. In that respect the answer to whether or not it is necessary to adopt accumulated experience does not depend on men's consciousness, will, or desires, though it is reflected in their consciousness like many other objective processes.

In real life a generation is not separated from the one following it either in time or in space. Since there are individuals in society of all ages at any moment who possess experience that differs in level and sphere of operation, the transfer of accumulated experience from generation to generation is not solely effected as a relation between contiguous generations, but also takes place in the form of the sum total of people's relations with one another, the aggregate of social relations.

In the same way the accumulation of experience in the future cannot be reduced to the independent activity of one subject taken separately. Each individual, be he scientist, inventor, or what have you, can therefore only function in the real role of scientist, inventor, etc., because the experience of his predecessors in this field of practical and intellectual activity has already been passed on to him, and because this experience is already present in him as the result of the activity of many people over many centuries as a certain sum total of knowledge and a certain ability to apply this knowledge to achieve a set aim. In the complete absence of experience accumulated by predecessors the individual, whatever natural inborn qualities he or she may possess, will not only be unable to function as a dis-

coverer, but will inevitably remain (as we have seen) at the level of an animal.

The accumulation of experience is a social relation not only in its origin but also in its ultimate point. One can imagine a Robinson Crusoe scientist who possesses experience passed on to him by society, and the means for its further accumulation. Working quite alone he may create some new object or discover a previously unknown objective law, i.e. he may build up experience. But this 'accumulation for oneself' is not actual accumulation because 'experience accumulated for oneself' inevitably dies along with its isolated possessor. For that not to happen the isolation must be overcome, and the accumulated experience must become the property of other people, i.e. it calls for the existence of relations of the individual with other people, or the existence of social relations. It is precisely in that respect that experience 'accumulated for oneself' will not disappear but will function as actually accumulated experience. Only such experience can live on in the activity of other people after the death of its possessor which finds expression in material form, in the form of objects made by a man or of descriptions of laws discovered by him. That is only possible, however, when experience becomes the possession of other people through forms that express it.

Karl Marx, commenting on the social conditionality of the scientific discoveries that find application in technology, wrote in a footnote:

> A critical history of technology would show how little any of the inventions of the 18th century are the work of a single individual. Hitherto there is no such book. Darwin has interested us in the history of Nature's Technology, *i.e.*, in the formation of the organs of plants and animals, which organs serve as instruments of production for sustaining life. Does not the history of the productive organs of man, of organs that are the material basis of all social organisations, deserve equal attention? And would not such a history be easier to compile, since, as Vico says, human history differs from natural history in this, that we have made the former, but not the latter? Technology discloses man's mode of dealing with Nature, the process of production by which he sustains his life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them.[20]

The definite link between the transfer of accumulated experience and the social organisation of upbringing and education stems from the fact that this transfer is a necessary social relation existing whether or not people are

aware of its character. Just as the relations of material production receive the juridical form of property relations and are expressed in ideological legal relations, so relations in regard to the transfer of accumulated experience existing independently of consciousness appear in the form of ideological relations of upbringing and education, which have a class character in class society. Starting from the existing conditions people can adopt one system of education or another at their discretion, but the system, being only a reflection in their consciousness of the objective law of the transmission and accumulation of experience cannot abrogate or alter the operation of that objective law.

The juridical and political superstructure, we know, can either retard development of the relations of production or promote their rapid development, but in either case the true source of the development is not in the superstructure itself, but consists in the objective patterns of development of the relations of production. In the same way any system of education consciously or spontaneously established by people may open up the field for operation of the objective law of the transmission and accumulation of experience or, on the contrary, may raise obstacles in the way of its operation.

Experience is produced and reproduced only in the course of men's joint activity. Outside activity experience is as majestic and as dead as the Egyptian pyramids. When we examine the history of mankind's evolution as a whole, experience coincides with activity and merges into the aggregate of social practice. But the meaning that this concept of experience is invested with here allows us to draw a line, important in our view, between the concepts of practice and experience as concepts reflecting different aspects of the interaction of subject and object that are a unity. When speaking of practice we have in mind primarily man's material, mediated activity as a whole, while by experience we mean the result, and at the same time the starting point, of that process.[21] In other words, the concept of practice characterises the interaction of subject and object from the side of its continuity, and the concept of experience from the side of its intermittency, lack of continuity, and discreteness.

Differentiation of these two sides of the interaction of subject and object (by whatever terms these aspects are designated) makes it possible to disclose certain essential

features of the social nature of the transmission and accumulation of experience in human society in contrast to the biological laws of the transmission of the 'relay of life' from generation to generation. If the process of men's direct life activity were not objectified in material and linguistic form as 'its other', yet differing from the process itself as its 'quiescent' result, the transmitting and accumulating of socio-historical experience (about which we spoke above) would in fact be impossible.

Since mankind's history occurs in conditions of a natural succession of generations, accumulated experience is the result, from the standpoint of each new generation, of the activity of preceding generations and at the same time the starting point of its own activity. The same can be said about the individual person.

The fact that accumulated experience functions in relation to part of the whole as the result of preceding activity and the starting point of succeeding activity, and not as the process of activity itself, contains an abstract possibility of separating experience from the process of active, transforming activity. The result and the starting point may not coincide in time. The experienced turner, for example, will not cease to be an experienced turner when he leaves the lathe to rest. If activity and experience directly coincided, cessation of activity would mean slow disappearance of the experience that is realised in that activity; and since the individual deprived of human experience sinks to the level of the beast, even a temporary cessation of labour could turn man back to the ape-like state from which he emerged through labour.

In fact, however, that does not happen. Experience and labour do not directly coincide, and that provides a possibility of isolating experience from the labour process, a possibility that becomes reality in certain social conditions for some people isolated in society who do not take part in the creative activity in which experience lives and is enriched, but only 'consume' the experience preserved and accumulated by others. Possession of this experience makes it impossible for them to revert to the animal state, although they are not involved in the labour that transforms 'the ape into man'. If there had been no possibility in the very nature of human experience of isolating it from the labour process, it would have been impossible for exploiter classes (or even separate subjects not involved for one reason or

another in social-productive labour) to have arisen at any stage of history.

Allowing for that we can now define experience as a measure of the understanding and practical use of objective laws, i.e. experience is the measure of mastery of the object. In that definition experience is the result and starting point of practice, and practice functions as the process of mastery of the object, taken as a whole. In other words, the level of mastery of objective laws attained by human society at a certain stage of its historical development finds its reflection in experience.

The constant accumulation of experience is an indicator of man's ever increasing domination over external nature, the nature of his own relations, and over himself. From the standpoint of the productive side of human activity it marks the practical extension of his power over nature, and the creation of new, ever better machines, apparatus, structures, etc.; from the theoretical standpoint, the mental aspect, it marks the movement from ignorance to knowledge, from incomplete knowledge to fuller, the approximation of knowledge to absolute truth, or (as Marx put it) to theoretical taming of nature. These are the two inseparable, but different aspects of a single, sensuous human activity.

The beginning of this process of applying the objective patterns of nature was begun when man's ancestors,passing to use of tools as a mediator between themselves and the environment, in practice put the operation of objective laws into their service that yielded a substantial increase in the results of their own physical efforts, although our savage ancestors did not (as we have already said) have any scientific understanding of the operation of those laws.

In altering nature and employing it for his own ends, man cannot bring any forces to life that do not exist as a possibility in nature herself. His whole 'wizardry' consists in his making objects and forces of nature that exist independently of his consciousness, and correspond to objective laws, affect each other to yield results he needs. The basis of his transforming, creative activity is that he can understand and utilise these objective laws to create conditions in which they inevitably begin to operate; and in the process of creating the conditions necessary for that he once more, moreover, relies on the operation of objective laws known by him but independent of his consciousness. Though he himself is a part of nature, man subordinates objects and

forces of nature to himself, and prevails over them. But, as Frederick Engels said,

> all our mastery of it consists in the fact that we have the advantage over other creatures of being able to learn its laws and apply them correctly.[22]

Man himself, by his labour, creates the material wealth needed to satisfy his wants; he was, is, and remains the primary productive force. But he is ceasing, to an increasing extent, to be a direct productive force.

From the standpoint of class-determined relations man was wholly a direct productive force under slavery and partially so under feudalism. The slave and the serf 'themselves form part and parcel of the means of production', Marx said.[23] In slave-owning society the slave was considered on a level with animals, not as a man but as an instrument of labour or, as Aristotle said, 'a speaking tool'. But, from the standpoint of the conditions of natural history, man has been ceasing to be exclusively a direct productive force ever since he was differentiated from the animal kingdom.

As man accumulated knowledge he was emancipated more and more from the direct effect of his organs on objects given to him by nature that he processed in the course of making material goods. He laid this work onto instruments of production that he created. It was the latter, as the material embodiment of human knowledge of the objective laws of nature, that directly converted what was given by nature into objects and properties that were needed to satisfy human wants. As Marx wrote:

> The development of fixed capital indicates to what degree general social knowledge has become *a direct force of production*, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it.[24]

At a certain level of development of the social productive power of labour the production process itself may be converted into a technological continuation of science.

Western sociologists strain to find a contradiction in the fact that Marxists, when characterising the role of science as a direct productive force, recognise the productive forces as the determining moment in society's historical development. In that connection they draw attention to the following circumstance: new scientific discoveries are new just because we do not know about them in advance, and so

consequently cannot be predicted; but if the other features of society depend on science and technology, whose future it is impossible to foresee, it is thus impossible as well to foresee the path of development of society itself. That is the line of argument, for example, of the English sociologist H. B. Acton.[25]

Scientific and technical discoveries, though they are the result of man's creative activity, are not something mysterious, not permitting of rational explanation. The general line of development of science can be foreseen to the extent that it is determined by the needs of production, the level of development attained by science and technology, and the tasks that this faces mankind with.[26]

To what we have justifiably said here we can add the following: (1) the productive forces do not determine the form of society directly but through the aggregate of relations of production; (2) man cannot know about all the prospective discoveries in concrete spheres of science, but he does know that new advances of science, revealing hitherto unknown objective laws of nature, will thereby increase his opportunities to utilise natural forces.

As to the technological application of science, its new advances are ultimately directed to increasing, and not diminishing, the social productive power of labour. People may, of course, reject practical utilisation of a new discovery of an applied character if it gives worse results in a given sphere of activity than the practical application of earlier discoveries, or if its introduction would lead to destruction of their life. But since new discoveries can actually be used for practical purposes with a greater degree of success than before, people make the appropriate improvements in the instruments of production or create new tools, which leads ultimately to growth of the productive forces independently of what they do or do not think about the social consequences of that growth. The growth itself leads to a requirement for appropriate social conditions of production determined by the economic structure of society.

It is clear from Marx's statement about science cited above that he considered science's becoming a direct productive force as a process of the materialising of human knowledge in instruments of production and other means of labour. Science, by itself, understood simply as a certain sum total of knowledge contained in someone's head or even set down on paper, is not yet a productive force and it cannot, of

course, have determinant social significance. It acquires that role only when the sum total of knowledge is manifested in labour and in human activity to create objects needed to satisfy human wants.

The growing significance of second, or 'humanised', nature as a mediator between man and nature is not limited simply to the field of production activity. The introduction of mediators in the realm of science activity, for example, of instruments, has no less significance for extending the nature limits of the perceptive capacity of human sense organs than the application of tools to go beyond the limits of man's physical powers. Instruments were a means enabling objective processes invisible to the naked eye to be perceived sensuously, and making it possible to peep into the 'black box', so as to be convinced visually once more that there are no supernatural forces in it.

Examination of the use of instruments as a mediator between man and nature has the same significance of principle for a proper understanding of the development of the cognitive, scientific side of activity as analysis of the consequences of the making and use of tools for a characterisation of the practical aspect of man's sensory activity.

Science, when taken into the armoury of workers, and materially embodied in the new machines, and technological processes, etc., is increasingly converted into a direct productive force of society. But only the socialist revolution, which eliminates all forms of exploitation of man by man, provides the conditions for use of science's advances for the good of all members of society. The Communist Party of the Soviet Union regards organic union of the advances of the contemporary scientific and industrial revolution with the advantages of the socialist system as a most important task as concerns the further progress of developed socialist society.

Notes to Chapter 8

[1] Translator's note. The Russian word *opyt*, rendered here as experience, also contains the now obsolete sense of the English word 'experience' as test, trial, or experiment. This should be born in mind when considering the author's definitions and exposition.

[2] V. I. Lenin. *Materialism and Empirio-Criticism* (Progress

Publishers, Moscow, 1977), p. 133 (*Collected Works*, Vol. 14, p. 149).

[3] John Dewey. *Experience and Nature* (Open Court Publishing Co., Chicago, 1926), p. 28.

[4] V. I. Lenin. *Op. cit.*, p. 132 (*Collected Works*, Vol. 14, p. 148).

[5] See A. A. Bogdanov. *Empiriomonism*, Book 1 (Moscow, 1899), pp. 25, 36.

[6] See A. A. Bogdanov. *Filosofiya zhivogo opyta* (The Philosophy of Living Experience), Moscow, 1913, p. 221.

[7] Karl Marx. *Economic and Philosophic Manuscripts of 1844* (Progress Publishers, Moscow, 1975), p. 329.

[8] See G. W. F. Hegel. *The Phenomenology of Mind*. Translated by J. B. Baillie (Harper Colophon Books, New York, 1967), p. 144.

[9] *Ibid.*, p. 142 (Translator's note: Hegel's italics in German).

[10] Denis Diderot. *Textes choisis*, Vol. 2 (Éditions Sociales, Paris, 1953), p. 49.

[11] N. G. Chernyshevsky. 'The Aesthetic Relation of Art to Reality' (St. Petersburg, 1855), reviewed by the Author. *Selected Philosophical Essays* (FLPH, Moscow, 1953), p. 383.

[12] Karl Marx. Theses on Feuerbach. *Op. cit.*, p. 197.

[13] See V. I. Lenin. *Op. cit.*, pp. 135-137 (*Collected Works*, Vol. 14, pp. 151-153).

[14] The Russian word 'opyt' employed by the author is broader in meaning than the Greek *empeiria*, *praktikós*, *pragma*, or the English 'experience'.

[15] Philipp Frank. *Philosophy of Science* (Prentice-Hall, Englewood Cliffs, N.Y., 1957).

[16] Karl Marx, *Wages, Price and Profit* (Progress Publishers, Moscow, 1976), pp. 31-32.

[17] Karl Marx. *Theories of Surplus-Value*, Part III (Progress Publishers, Moscow, 1975), pp. 266-267.

[18] The eminent French anthropologist Prof. Henri Vallois discussed the most typical cases of this kind recorded by science in his article 'Les Enfants-Loups' in the journal *La Nature* (1955, 3237: 11-14).

[19] For information on the experience of the Zagorsk school and an evaluation of its results, see A. Meshcheryakov, *Awakening to Life. Forming Behaviour and the Mind in Deaf-Blind Children*, Progress Publishers, Moscow, 1979. In February 1975 an extended session of the Learned

Council of the Psychology Faculty of Moscow University heard some of the general results of a unique experiment in a group of blind deaf-mutes obtaining higher education (Sergei Sirotkin, Yuri Lerner, Alexandra Suvorova, and Natalia Korneeva). See 'An Outstanding Achievement of Soviet Science' in *Voprosy filosofii*, 1975, 6: 63-84.

[20] Karl Marx. *Capital*, Vol. I. Translated by Samuel Moore and Edward Aveling (Progress Publishers, Moscow, 1978), p. 352.

[21] The Russian term *opyt* (experience) is often used in a narrow sense to designate scientific observations and experiments, and research devoted to some problem. Clearly, these forms of activity (like others), understood as a process, do not embrace the concept of experience (*opyt*) in the sense we have adopted, but their results are part of this concept's totality.

[22] Frederick Engels. *Dialectics of Nature* (Lawrence & Wishart, London, 1940), p. 180.

[23] Karl Marx. *Capital*, Vol. I, p. 668.

[24] Karl Marx. *Grundrisse* (*Economic Manuscripts 1857-1861*) Translated by Martin Nicolaus (Penguin Books, Harmondsworth, 1973), p. 706.

[25] See H. B. Acton. *The Illusion of the Epoch* (*Marxism-Leninism as a Philosophical reed*), Cohen & West, London, 1955, p. 171.

[26] See G. E. Glezerman. *O zakonakh obshchestvennogo razvitiya* (On the Laws of Social Development), Politizdat, Moscow, 1960, pp. 74-76.

9

Class and the Human in Socio-Historical Experience

So far we have been trying to show that the transmission of socio-historical experience from generation to generation, as a measure of the understanding and practical application of objective laws, is basically a determined process that takes place independently of whether people are aware of its objective character. But since this process is a necessary aspect of the operation of the inner regularities of man's social life activity itself, it appears as a property of human history that does not belong to any one race, country, or part of the population, or to any exclusive group of people in society. Both the concrete form of the objectification of experience (the basic element of which, in the sphere of material production, is the tool) and its abstract form (in which the advances made at a given stage of knowledge of objective laws are objectified) have a human character by their very nature and can still not be, in themselves, the exclusive property of a separate nation, let alone a separate class within society.

Lack of understanding of that has made for great muddle in men's minds, even among would-be supporters of Marxism, and has led them into serious errors of a subjective-idealist hue. The 'leftist' approach to the problem of the relation of the class and the universal human elements in modern capitalist society objectively harms the communist and labour movement for the socialist transformation of society. In spite of its naiveté the position of ultra-lefts influences

some students and some sections of the working people who are not acquainted or are unfamiliar with the main propositions of Marxist-Leninist theory. One of the claims of 'leftist' extremists who employ 'radical, revolutionary' phraseology is, in particular, that revolutionary theory is incompatible with recognition of the existence of universal human values in class society, that every social factor in a society split into opposing classes has a class character rather than a general human one, and that the idea of humanism itself is a middle-class, bourgeois one.

Middle-class culture, of course, as a culture serving the interests of monopoly capital, has a class character rather than a universal, human one. It maintains a private-property psychology and justifies social inequality and the social system based on exploitation of man by man. That also applies to 'mass culture', the spread of which via the powerful media of the contemporary system of information has as its by no means last aim to divert the masses of the people of capitalist countries from the struggle for socialism, frightening them with propaganda about the danger that communism allegedly presents for the 'humanistic' ideals of 'free society'. It would be wrong, however, to conclude from the class character of middle-class culture that capitalist society does not create any material and spiritual values that are a contribution to the general development of mankind and that deserve to be preserved during the transition from capitalist to socialist society. Proletarian, socialist culture does not arise as a result of stark denial of all the achievements of culture made in the preceding stages of social development. Lenin put great emphasis on that in his speech to the 3rd Congress of the Young Communist League: proletarian culture, he said,

> is not clutched out of thin air; it is not an invention of those who call themselves experts in proletarian culture. That is all nonsense. Proletarian culture must be the logical development of the store of knowledge mankind has accumulated under the yoke of capitalist, landowner, and bureaucratic society.[1]

Appealing to the delegates at the Congress, he said:

> It would mean falling into a grave error for you to try to draw the conclusion that one can become a Communist without assimilating the wealth of knowledge amassed by mankind ... without acquiring that sum of knowledge of which communism itself is a result.[2]

What enormous sense there is in Lenin's words, which ring like a slogan for rising generations, and which can be met in almost every Soviet school: 'You can become a Communist only when you enrich your mind with a knowledge of all the treasures created by mankind.'[3]

The socialist revolution, while tackling the task of eliminating capitalist, middle-class culture, at the same time ends the exploiter classes' monopoly of assimilating the true values of human culture, and makes them the birthright of the broad masses. One of the contradictions of a society based on the exploitation of man by man is just that material and spiritual values, which themselves do not have a class character, are in fact *appropriated* by the exploiters who use them in their own interests. When we look from this angle at that aspect of socio-historical experience which expresses the level of understanding and practical use of nature's objective laws, and which is objectified in the concrete form of tools made by people, the general human content of that form comes out with full clarity, because man became distinguished from the animal kingdom as *Homo sapiens* precisely through his transition to using tools. As for private property in tools, which exists in class, antagonistic society (e.g. under capitalism), what matters is not that they (and the means of production as a whole) belong to capitalists, and are therefore class things, but that they, though not class things by their nature, have nevertheless been appropriated by the capitalists.

The same can be said of the knowledge of the objective laws of nature amassed by human society, and about use of the advances of the natural sciences in general, and of the technical sciences in particular. The undoubted fact that they are exploited by monopoly capital for its own ends does not mean that the laws discovered by science have a class character.

The majestic creations of the geniuses of literature and art of the past. who correctly depicted in artistic images the characteristic features of the social life of years long past, the struggle of good and evil, the beauty of nature and of man himself, are equally the cultural birthright of society as a whole, with a general human significance.

The universal human value of the results of labour embodied in 'humanised' nature, which appear in the form of tools from the stone axe of antiquity to modern machine tools with programmed control, in the image of the formu-

las of Einstein's theory of relativity given outward shape on paper, the novels of Lev Tolstoi, or the paintings of Raphael, is quite clear, and it does not present any special difficulty to understand it.

It is a much more complicated business to discover the universal human content in the *social relations of people themselves* who are divided into opposing classes in class society, when the essence of man, as the 'aggregate of all social relations' is manifested primarily as a class essence. This point deserves more detailed examination, because the answer is linked with further concretisation of the concept 'man' on the plane of the method of investigation that we have adopted, which consists in ascent from the abstract to the concrete.

Objective laws operate independent of consciousness, of course, not only in inanimate and animate nature, but also in society. Each of the different forms of the motion of matter, including social life, has its own qualitative determination distinguishing one from the other, but from the angle of the possibility of man's understanding and practical application of the objective patterns underlying each form of the motion of matter, there is no difference in principle between them; he can understand and use the laws of development not only of nature but also of society.

The objective laws of nature, and those of society, while qualitatively different, are at the same time interconnected as laws of matter in motion independent of consciousness, in which one form of motion develops from another. This link finds expression as well in the understanding of objective laws. As Engels put it:

> Just as one form of motion develops out of another, so their reflections, the various sciences, must arise necessarily out of one another.[4]

The general and the particular features of the objective laws of nature and society find reflection not only in the process of understanding them, but also in the course of their application. This theoretical mastery does not yet lead automatically to their practical mastery, i.e. to use of known laws in man's practical activity. When an objective law is understood people may or may not apply it for various reasons, may use some of the results of its operation and not others, or may use separate laws in order to eliminate undesirable consequences of the operation of others.

The process of understanding and practical use of the objective laws of developing society also finds reflection in the accumulation of experience as an indicator of the level reached during the process. While the concrete form of the objectifying of experience in relation to nature is 'humanised' objects of nature altered by man, experience in regard to society is objectified in a transformation of the relations of people themselves, and in the definite form of their social organisation. The concrete form of experience asserts its concreteness in its having its special object in each form of activity and in its manifesting itself in a special shape. Its abstract form, however, i.e. language, preserves its universality in the expression and accumulation of knowledge both of the laws of nature and of those of social development. From the subjective aspect, the concrete form of experience of people's interaction with one another is manifested as an ability to achieve a certain organisation in joint activity, on the basis of a given mode of material production, while the abstract form is displayed in knowledge of the conditions for attaining that organisation.

The primitive group was already a certain organised whole connected by its members' mutual dependence on one another in their common struggle for existence. As already remarked, moreover, the individual member of the primitive social organisation functioned as a species being. The undifferentiated character of clan and individual interests characteristic of the classless, primitive communal system was succeeded in the course of society's development by a social differentiation of people, and society was split into opposing classes. The inner logic of the transition of classless society to a class one has been brought out by historical materialism, which demonstrates that the cause lay, in the final analysis, in development of the productive forces of society. While their level of development was so low that a man could not produce more than was needed to sustain his life, there was no sense in converting one man into the slave of another. The slave would only have been able to feed himself and would not have yielded a surplus product to be appropriated by someone else. There was consequently no basis for the rise of private property and exploitation of man by man.

With growth of the productive forces a man began to produce more than the bare minimum needed to sustain his life. A surplus appeared that could be appropriated by some-

one else while preserving the life of the producer himself. The development of such a surplus meant the rise of a possibility of exploitation of man by man. But, in order to convert that possibility into reality, there had to be conditions that would inevitably lead to its realisation.

Within the context of our scheme $S \rightarrow M \rightarrow N$, growth of the productive forces (understood as a process of joint mediated interaction of men and objects and forces of the natural medium external to human society) still did not predetermine the inevitability of the rise of exploitation of man by man. With development of the surplus mentioned above two equally possible paths were open to society, in fact, from the logical standpoint: (a) a possibility of the surplus's being appropriated by some of the members of society, separating off into an exploiter class; and (b) a possibility of ever fuller satisfaction of the needs of all members of society through equal distribution of the increasing product of labour among all its members.

At first glance it is more logical to suppose that society would have taken the second road; the force of the traditions of primitive society (and it is impossible not to reckon with that really imposing force) made for preservation of the equality of members of the community in the distribution of material goods. But history witnesses that society took the first road in its development, i.e. the path of the appearance of exploiter classes. It did not take it, moreover, because of the 'evil' will of people themselves, though that 'evil' will was inevitably present in history equally with 'good' will, and was involved in realisation of the historical process.

Subjective-idealist conceptions that try to explain the transition from the primitive communal, classless system to class society by its having come into the head of some members of that community to grab part of the objects of consumption over and above what he needed to support life, or to fence off a patch of land and say 'this is mine', are incompatible with the materialist conception of history. The conversion of classless society into a class one was not dreamed up by anyone; it was the product of society's inner development, arising by force of circumstances that were not dictated by a supernatural power or imposed by the wilful decision of some individual. The cause was the social division of labour at the stage of society's historical development when people could not subordinate operation of the

objective social laws created by it to themselves, and had therefore lost control over its results.

Up until then, man, together with the clan (of which he was an integral part, and within which he produced everything needed to sustain his life, without losing control over the product of his own labour) could depend only on external nature and on relations within the clan, of which he was an equal member by virtue of birth. With the division of labour he was cut off from the umbilical cord of the primordial community; now he no longer directly produced, together with the clan, the whole set of products needed to sustain his life. He became an independent partial producer of some concrete type of product that did not constitute the whole of the set of vitally necessary goods. He was only a herdsman, a landworker, a potter, or a tailor.

On the historical plane, of course, this independent producer did not appear once ready-made, and mutual exchange could not in fact immediately acquire the character proper to simple commodity production. But, to simplify our exposition, we can abstract the fact that the subject whose activity was limited to a certain sphere of material production as a result of the division of labour was originally not a separate individual but a group of people united, for example, in a clan, family, or caste.

The social division of labour thus led to the product of labour becoming an indirect, mediating link in people's relations with one another, and these relations themselves, too, acquiring the form of relations between things. A thing, as a commodity that mediates the mutual link between people, contains the dialectical contradiction proper to a mediator, and has a dual character, the true nature of which was revealed by Karl Marx.

People's mutual dependence stemming from their joint activity was already a great force in primordial society. But this force was not then separated from them or counterposed to them as an alien force standing above them. With the rise of a social division of labour the position was sharply altered. People, not yet understanding what in fact had happened, fell under the power of their own interdependence, which now already stood above them as an alienated, mysterious, dominant force. Once this alienated force had appeared, irrespective of whether or not people wanted it, its personification as a political power was not long in

coming. Figuratively speaking, the 'throne' had been built and it simply remained to fill it.

It is quite explicable that it was occupied, in fact, by the economically dominant class. Along with the splitting of society into opposing classes the state appeared. The force of people's mutual dependence in the field of material production was not dreamed up but was appropriated by the exploiter class and converted by it into a force defending its class interests.

The economically dominant class became the politically dominant one by means of the state. The force of the state machinery was put into action to defend the exploiters' interests. The dominant class's ideas were confirmed as the dominant ideas in society, and the exploiters not only condemned the working people to material poverty but also appropriated to themselves the right to preferential use of spiritual wealth, leaving the exploited in darkness and ignorance.

The forms of exploitation of man by man changed over the ages; slavery and serfdom were succeeded by economic constraint of the working class under the flag of formal equality. The force of people's mutual activity did not, however, cease to bear the character in any exploiter socio-economic formation of an estrangement or alienation from the people themselves. The splitting of society into classes is the negation of aggregate man, confirmation of the counterposing of the concept 'individual' man to the species concept of social man. But that does not, in general, mean that the concept 'man' does not reflect a real content. It functions in consciousness in general as a mental reflection of man's most common properties that actually exist in society.

If there is no worker in general in real life, i.e. no abstract worker, but only concrete, living workers, each differing in some way from the others, it does not mean that the worker in general exists only as a concept in someone's consciousness. In its developing class battles the working class demonstrates the reality of its existence in practice and comes forward as a force capable (in alliance with other progressive forces) of ensuring the transition from capitalism to socialism.

It is just the same with the concept of man in general. In real life there is no abstract man, but there are quite definite, concrete individuals. That still does not mean,

however, that the concept of man is a myth with nothing to correspond to it in real life. It is quite difficult to lay bare the specific, universal human content in social relations, especially when mankind is split into antagonistic classes, but that does not mean that such general human properties do not exist. They are embedded in the very nature of man, and inevitably appear along with his differentiation from the animal kingdom, and develop together with the development of human society.

In an antagonistic society the general human properties that constitute the specific peculiarity of man are difficult to discover, not because they do not exist, but because they are manifested in special forms. They cannot be manifested directly as universal properties in that society because they are woven into the fabric of class relations. Since the splitting of society into classes signifies the negation of aggregate man, none of the classes can present itself as such. Aggregate man also cannot find his direct reflection in the aggregate of classes taken statistically. That thesis can also be extended to capitalist society and its main classes—workers and capitalists.

Marx had already noted in one of his early works that

> in the fully-formed proletariat the abstraction of all humanity, even of the *semblance* of humanity is practically complete; ... man has lost himself in the proletariat.[5]

The class of capitalists is also not the representative of all humanity. Capitalist monopolies control the economic life of capitalist society and exercise political functions in it either directly or through their representatives, passing that off as actions performed in the name and interests of the whole nation. But the alienation of the working class, whose product and labour process itself no longer belong to it, is at the same time estrangement of labour from capital, and alienation of the class of capitalists as an exploiter class.

The alienation of the exploiters has an essential peculiarity, of course. In *The Holy Family* Marx and Engels remarked:

> The propertied class and the class of the proletariat present the same human self-estrangement. But the former class feels at ease and strengthened in this self-estrangement, it recognises estrangement as *its own power* and has in it the *semblance* of a human existence. The class of the proletariat feels annihilated in estrangement; it sees in it its own powerlessness and the reality of an inhuman existence.[6]

The capitalist class's claims to express the interests of society as a whole are in fact only an attempt to give its vested interests an illusory form of general interest.

Aggregate man, who is lost in class society, being an expression of real, universal human qualities, is only capable of finding himself again through 'negation of the negation', through the abolition of class society. He exists in class society as the possibility of its elimination. This possibility can be realised in struggle to end the society based on exploitation of man by man. It actually found and finds its practical expression in class struggle, which is the driving force of the development of class-antagonist society. The progressive social forces fighting to eliminate the old forms of social life, and to establish a new system, correspond to the needs of society's further development, and enter this struggle as the bearers of human relations.

There was a time, for example, when the capitalist middle class was the spokesman in essence, as well as in form, of the interests of society as a whole. That was the time when this class, which arose in the womb of the feudal system, led the fight for overthrow of the power of lay and spiritual lords. But that period was historically limited and ended with the middle class's seizure of state power. The measure of expression of the interests of the nation as a whole was then the degree of revolutionary consistency in the fight against the old ruling classes. With its coming to power the middle class ceased to be revolutionary. The middle class, capitalist state, which came forward formally as the spokesman of the interests of the whole nation, became in essence a weapon defending the interests of the class of capitalists.

So, with the splitting of society into opposing classes, experience of man's struggle for social equality and for emancipation from all forms of exploitation and oppression was thus amassed in class battles of the oppressed against the oppressors, of progressive forces against the forces of reaction. Images of courageous freedom fighters who led revolutionary actions (like Spartacus, Pugachev, Marat, and other leaders of the revolutionary masses) have always gone down in history as spokesmen of the hopes of the oppressed and destitute for a truly human, rational, just society. The onward march of history led, finally, to a time when capitalist society had moulded a working class capable of realising the historic mission of emancipating mankind from

all forms of exploitation of man by man, while knowledge of the separate aspects of social reality accumulated by people led to discovery of the objective laws of social development. The credit for that discovery belongs to Karl Marx and Frederick Engels. Since then, true humanity, reflected in the ideas of communist humanism, has found embodiment in the struggle to overthrow the dominance of capital and to build socialism and communism. Middle-class ideologists, when pointing out that Marxist-Leninist theory is based on recognition of the need for class struggle in class-antagonist society, often try to picture matters as if this theory lacked any moral, universally human content. We would recall here that right-wing Social Democratic interpreters of Marxism, like Karl Kautsky, Heinrich Cunow, and others, had already in the last century attacked Marx's theories as lacking an ethical basis.

The 'ethical' basis of the building of a classless society, characteristic of the spokesmen of utopian communism, was subjected to sharp criticism, in fact, by the founders of Marxism-Leninism. The transition from capitalism to socialism is an inevitable process dictated by objective necessity, independent of consciousness. The era of socialism and communism does not set in as a result of people's good intentions or moral self-perfection. At the same time, however, no one else has demonstrated, as the founders of scientific communism did, and with such definiteness, that objective necessity finds its reflection in man's consciousness in the form of various ideas, including 'morally tinged' ones. When these ideas correctly reflect the maturing objective needs of society, they are grasped by the masses and become a material force transforming society. Discovery of the patterns of social development does not, in itself, lead to social transformations. Just as the natural force of fire can result, on the one hand, in calamitous conflagrations, but on the other hand it can, when tamed by man, bring him undoubted benefits, so spontaneous operation of the objective laws of society, once discovered and explained, can be directed into a channel desirable for society. But to do that it is necessary not only to explain the human world but also to apply the explanation in order to transform it in practice.

The lever of this transformation is the active, practical activity of people themselves. The separate aspects of the laws operating in society which they have discovered, and

which are manifested as growing social needs, and equally as knowledge of the laws of social development, must not only be reflected in consciousness in the form of definite ideas, but at the same time must become definite standards of people's behaviour, and their guide to practical activity. One way or another, these standards inevitably become the measure of human actions and consequently have a moral content.

The objectively maturing necessity to replace capitalism by socialism is manifested in the standards of communist morality, which functions as a direct, impelling cause directing the behaviour of millions of people in their struggle to realise the ideals of building a truly just society. That aspect of the matter was distorted by the above-mentioned theoreticians in their struggle against the 'ethical' basis of Marxism; they claimed that, since the onset of the era of socialism was as inevitable as the dawn after a dark night, the more the working class took the road of active political struggle to eliminate capitalist social relations, the more it had an interest in developing the productive forces of capitalist society. Matters came to the point that the socialist revolution, made in Russia in 1917 under the leadership of the working class led by the party of Lenin, which laid the basis for practical triumph of the ideas of Marxism, was declared nothing more nor less than un-Marxist, on the grounds that the level of development of the productive forces in Czarist Russia was below that reached in several capitalist countries in the West. So the critique of the 'ethical' basis of Marxism led to denial of the revolutionary role of Marxist-Leninist theory and its transforming character, and to rejection of struggle for socialism.

While the working class fights to preserve itself as a class within capitalist society, it acts in both form and essence as the spokesman of partial, class interests. During that struggle it can win satisfaction of separate demands and secure more favourable living conditions. Marxists-Leninists have always been resolute supporters of that struggle, but at the same time have pointed out its limited character. Economic forms of class struggle encourage growth of the workers' class consciousness but cannot, of themselves, lead to liquidation of the system of capitalist ownership of the means of production.

The universal human struggle, in its full sense, is also the struggle of the working class, the aim of which is to

overthrow the power of capital and abolish the socio-economic formation based on exploitation of man by man. The ultimate aim of that struggle is the building of socialist and communist society. It is in the struggle for communism that general human qualities, lofty human morality, and the beauty of man's emotions and reason are revealed. Only in that struggle does the working class come forward as the spokesman of the interests of society as a whole. And whatever middle-class sociologists may say about the establishing of human relations between capitalists and workers, truly human relations are only possible under capitalism as relations of struggle for the socialist transformation of society.

Communism is based, as a science, on understanding and application of the objective laws of social development; by virtue of that it has a deep ethical grounding. Universal human morality is manifested in the character of Communists. There is no more noble aim than the great goal of building communist society, the most just and truly human society. 'Communist morality,' Lenin said, 'is based on the struggle for the consolidation and completion of communism.'[7]

The struggle to build communism is mankind's struggle against inhumanity. Anyone can join the ranks of the battlers for communism, irrespective of what class he belongs to, when he properly understands his human dignity. History knows many examples of individual, middle-class persons who have taken the side of the Communists. The great truth of the ideas of Marxism-Leninism enabled them to rise to the level of the interests of society as a whole, and led them to break with their class, which had become a brake on the path of social progress.

The building of socialist society, the first phase of the communist socio-economic formation, is a decisive step toward eliminating alienation of the results and process of the activity of the mutually related members of society, an estrangement that is a consequence of the social division of labour. By basing themselves on discovery of the objectively operating laws of social development, people acquire the faculty of employing the force generated by their own activity as their own force, which is not counterposed to them as a hostile social factor enslaving them. For the first time in history the state is becoming the real and not the fictitious representative of the overwhelming majority of

the public, and then of the whole nation. The historical fact that the social division of labour led, in certain historical conditions, to the division of society into antagonistic, opposing classes still does not mean that the division of labour is linked, in any conditions, with an inevitability of the division of society into classes. The social division of labour was a direct cause of the rise of class society because it was formed in conditions when society could not secure its control over the production and consumption of material goods in the interests of each and all.

Liquidation of the negative social consequences of the division of labour, and above all of the exploitation of man by man, is not therefore linked with inevitable elimination of the division of labour itself. On the contrary, every attempt at forcible elimination of the historically formed division of spheres of activity in the production process would lead to disruption of society's productive forces, with all the results stemming from that.

It is not a matter of eliminating the division of labour but of altering the conditions in which it necessarily produces and reproduces exploiter classes. That is realised through liquidation of private ownership of the instruments and means of production, and putting them at the disposal of society, so as, on the basis of knowledge and application of the objective laws of social development, to ensure planned, proportionate development of the productive forces and, at the same time, harmonious perfecting of social relations and of each individual.

Abolition of the exploitation of man by man, which is an enormous advance on mankind's historical road, does not lead to immediate disappearance of all the negative consequences of the division of labour. Demarcation of spheres of activity between the members of society limits the activity of each of them, and ties them to performance of more or less limited operations repeated day after day. This chaining of each individual to a certain form of labour, which society cannot eliminate without disrupting the foundations of material production, and so of society itself, is a visible contradiction of each individual's striving for free, all-round development.

That contradiction will be resolved in the course of building socialism and communism. Even when a given type of work does not give one inner satisfaction, and the sphere of activity cannot be changed for a number of vital circum-

stances, one has nevertheless to work, because society depends on the work of each individual: and in the final analysis the well-being of society as a whole, and so one's own well-being, hang on it. The very fact of awareness of the social significance of a given type of socially useful labour, once the system based on exploitation has been eliminated, makes labour more attractive in the eyes of workers as a conscious need to work equally obligatory for everyone. Obligatory labour for the good of all society, which each member is aware of as a necessity, ceases to be the curse of humanity. Awareness of this necessity as yet represents liberation from oppressive chaining to monotonous activity only in an abstract, ideal form. But this abstraction is a reflection of a real transformation of people's relations during the socialist revolution, transformation that leads to abolition of ruling classes that have lived by appropriating the results of others' labour.

The elimination of exploiter classes and building of socialist society lead to this, that mutual exchange of activity no longer acts as an alien force impoverishing people. That does not mean, of course, that the force disappears. On the contrary, people's interdependence continues to operate, given developing division of labour. The estrangement is eliminated to the extent that conscious, scientific regulation of production and consumption is really ensured, based on all-round allowance for the operation of objective laws. Subjectivism in direction of the economy that does not take objective laws into account leads to that force coming out again into the open as a necessity counterposed to people. The deep foundations of a strengthening of the role of the subjective factor in a scientifically organised society lie in people's getting the opportunity, during joint activity, relying on knowledge of the objective laws of social development, to build their relations both with their environment and with each other in the fullest possible agreement with the requirements of these laws.

Truly human sensuous activity presupposes the existence and further development of accumulated human experience. The amassing of experience, as a process of the subject's ever-increasing domination over the object, is essentially a creative process. Creative activity elevates and ennobles man, irrespective of the material or theoretical field in which it finds application, and not only maintains his specifically human qualities but also develops them fur-

ther. Creative labour gives man profound inner satisfaction.

In order for each individual's labour to become creative work, a whole series of social conditions is needed, whose creation becomes the real business of society for the first time, when it is freed of exploitation of man by man. One of these conditions is that each member of society should be given broad opportunities to assimilate and master the human experience amassed in the field of activity he prefers, and which most fully corresponds to his natural inclinations and capabilities. He has the right and duty to draw just what he needs from the treasury of historical experience, so as himself to have the chance to make his contribution to its further development. The social individual's development is what functions as the basic foundation of production and wealth.

Growth of the knowledge and skill of the working people of socialist society, who constitute the main productive force, leads to gradual elimination of the negative consequences of the social division of labour. But these consequences can only be fully liquidated in a society in which an abundance of material wealth and its distribution according to the needs of each member have been achieved, i.e. under full communism. Insofar as the overwhelming majority of the members of society can choose their trade or profession as they will, without disrupting normal functioning of production, their labour will become voluntary and creative, satisfying their inner vital needs.

It is possible that in the first stage of a highly developed society that has achieved material abundance, not everyone will yet be able to be guaranteed work that fully coincides with his inclinations. The interests of the development of production may still require the obligatory involvement of certain masses of people in forms of work that for one reason or another are not attractive, and society will have ro ensure performance of those types of work in the interests of all members of society. It is quite possible that communist society will find the answers to such problems while preserving the voluntary aspiration of highly conscious workers to make their contribution to the common cause without loss of their individuality.

Even such conscious self-limitation of freedom of choice of sphere of activity, however, nevertheless remains a limitation at this stage of development. Constant performance

of monotonous operations in the labour process, whether physical or mental, ultimately impoverishes man both physically and mentally. The real symphony of labour is only heard *tutti* when these operations are not an end in themselves but a means of harmonic movement and development of man's intellectual and physical powers, and a source of joy and happiness for the living human organism. The most important moment in man's emancipation from the enslaving forces of the division of labour, together with the transmutation of the forces caused by that division into a factor controlled in the interests of society as a whole, is liberation of the individual from dulling, monotonous operations and their transfer to machines.

As we have already said, human activity differs from the actions of animals in that man puts instruments of production between himself and nature, forcing objects and forces of nature to interact with one another in his interests. Man is freed more and more of the necessity to affect objects and forces of nature directly by the organs of his body in the process of transforming them, the aim of which is to satisfy his needs. 'Humanised' nature is becoming a direct productive force on an ever-growing scale, including the material embodiment of human experience, i.e. people's knowledge and skill.

Sooner or later the time will come when man will transfer all heavy work onto instruments he has made, leaving for himself, in the field of material production, only the creative functions of control and management, repair and maintenance and the setting up of systems, machines, etc. But he is not in a position to do that when the results of the action of the forces of nature tamed by him, meant for the existence of society as a whole, are appropriated in the interests of a dominant class. Without the abolition of private property in the instruments and means of production the overwhelming majority of the members of society not only will not achieve an easing of their fate through use of machines but, on the contrary, will become simply appendages of the technical monsters they have created. The introduction of the latest advances of science and engineering into production and its 'robotisation' under capitalism lead to growth of chronic unemployment, make the broad masses of the workers fearful of their future, uncertain of the morrow, and afraid of finding themselves among the 'surplus' people.

The socialist social system opens up broad opportunities for eliminating the negative social consequences of the present-day scientific and industrial revolution in conditions in which the productive forces can be developed in a planned way in the interests of society as a whole, and when people's relations of production exclude exploitation of man by man. It is a classless society—a natural stage on the road to communism—in which the universal, human features begin to be manifested in the relations of each and everyone precisely as universal human relations and not class ones. These features are already beginning to take shape in developed socialist society. We call them characteristic features of the new man, while we call the creation of the social conditions for development of his character, and the adoption of measures of social influence to stimulate this development, social education of the new man.

Conclusions (that in our view are important and relate to certain aspects of social progress) follow from the universal, human character of social and historical experience as a measure of understanding and practical application of objective laws, and from the peculiarity of experience, which consists in its being not the process of activity but its result and starting point (a feature we call the intermittence of experience).

The intermittence of experience contains the possibility of passage of that part of mankind which, for one reason or another, has lagged behind the highest level of development of a given period, to the highest level, by-passing several intermediate stages. There is no need 'to invent the bicycle' again each time. In order, for example, to develop modern means of communication, a backward country need not necessarily repeat in practice the whole history of the development of railway transport, beginning with Watt's steam engine or the locomotive of the Cherepanov brothers. That applies not only to genesis of the productive forces as application of known objective laws of nature but also to utilisation of the objective laws of the development of social relations.

Insofar as the laws of social and historical development are known to some of mankind, and utilised by them in practice, socially backward countries get an opportunity to restructure their life consciously, taking into account the experience being amassed by socially advanced countries. This experience can be taken as the starting point not only

in countries with developed capitalist relations but also in ones whose development was held back by long colonial domination.

Economically less developed countries can take a non-capitalist road of development, guided by Marxist-Leninist theory (which for the first time scientifically substantiated the inevitability of the onset of the era of socialism and communism) and relying on the practical experience of the peoples of the Soviet Union and other socialist countries, and can take the road of building socialism, by-passing the intermediate stage of the capitalist socio-economic formation (which inevitably had to be passed through with spontaneous operation of the not-understood objective laws of society).

Marx, Engels, and Lenin spoke of the possibility of a non-capitalist road of development, and pointed out some of the obligatory conditions necessary for furthering its realisation. The main condition, in particular, is victory of the socialist revolution in advanced countries and help for backward countries from them.

Lenin, stressing the extraordinary importance of help for underdeveloped countries, said:

> with the aid of the proletariat of the advanced countries, backward countries can go over to the Soviet system and, through certain stages of development, to communism, without having to pass through the capitalist stage.[8]

Marx's well-known thesis, in the foreword to *A Contribution to the Critique of Political Economy*, that

> no social order is ever destroyed before all the productive forces for which it is sufficient have been developed, and new superior relations of production never replace older ones before the material conditions for their existence have matured within the framework of the old society,[9]

does not contradict the possibility of a non-capitalist road of development.

This statement applies to the history of all mankind's development, because history is a determined process, and mankind as a whole cannot 'jump' any stage of its social development. But it is not absolutely necessary for all peoples and countries to go through all the stages of development one after the other, if there is a chance of using the experience of a more progressive social structure amassed by some of mankind as the starting point for further development.

Nations emancipated from colonial slavery face a radical problem: what road should they advance by? the capitalist or the socialist? A correct choice can be made by taking into account the social and historical experience amassed by mankind. And this experience indicates that socialism is a higher stage of social progress than outlived capitalism.

The nations of Asia, Africa, and Latin America see a graphic example of what great results can be won in social development in the life of a single generation in the experience of socialist development of the backward periphery of old pre-revolutionary Russia.

The experience accumulated by the socialist countries of restructuring social relations on the basis of knowledge of the objective laws of society's development is the birthright of all mankind. For the peoples of countries that are fighting to achieve actual independence from imperialism, and not just illusory freedom, and are pursuing a really independent policy, there are no insuperable obstacles to utilising that experience.

Experience of the struggle for mankind's freedom, acquired over the course of its history, finds expression in the unity of the theory and practice of building communism. Socio-historical experience, as a yardstick of understanding and practical utilisation of objective laws is also a yardstick in that respect of the freedom of mankind. As Engels wrote in *Anti-Dühring*:

> Freedom ... consists in the control over ourselves and over external nature, a control founded on knowledge of natural necessity; it is therefore necessarily a product of historical development. The first men who separated themselves from the animal kingdom were in all essentials as unfree as the animals themselves, but each step forward in the field of culture was a step towards freedom.[10]

The fundamental dialectical thesis about freedom as knowledge of necessity is confirmed by the whole course of socio-historical development. In our time it has a special ring, when crisis situations that have a global character are exacerbating people's relations both with the environment and among themselves. Man's broad-scale intervention in natural processes has given rise to ecological problems that are causing alarm for the future of mankind. Attempts are being made on that background to counterpose the need to defend nature and safeguard the human environment to the Marxian thesis of man's taming of

natural forces, and his owing his emergence from the animal kingdom and progress along the road of freedom precisely to the fact that he knows how to put the laws of nature to his service.

This counterposing is intended for persons who are poorly acquainted with the principles of dialectical materialism or who do not know them at all. According to Marxism, as we have already said, the eternal and natural condition of life, including man's, is exchange of matter between the living organism and the external natural medium. From that standpoint breach of that condition, including an alteration of the environment that would make such exchange impossible, would lead to the death of humankind. The fact that man, unlike animals, carries out this exchange both directly and in many respects indirectly, through 'humanised' nature, in no way alters the 'eternal and natural condition of life'.

Furthermore, since men know and utilise precisely *objective* laws of nature for their purposes, and so are classed as creatures possessing *reason*, a rational attitude to the objects and forces of nature must, it would seem, include in itself a prevision of the results to which the operation of the objective laws employed by man may lead. For by objective laws are meant, in dialectical materialism (as we have already said more than once), precisely those laws that operate independently of the consciousness, will, and desires of the individual, of social classes, and of mankind as a whole. And if people's activity were to lead to a change in the environment that made it objectively unfavourable for human life, they would have to kiss life good-bye.

The fact that the need to defend the environment has a universal, and not a class, character, does not remove the question of which social system is best able to cope with these problems, but rather poses them even more sharply: the system based on common ownership of the means of production, on planned management of economic affairs, and on inculcating a feeling of collectivism in people? or the system under which the means of production are in the hands of private owners, and the supreme law of business activity is the chase for maximum profit, while the common interests are sacrificed to selfishness?

Advocates of scientific communism who consistently defend their class position do not oppose class to the universally human, but on the contrary see the sense of class

struggle in a restructuring of society that will most correspond to people's hopes for a life worthy of every man. The consistent struggle of the Communist Party of the Soviet Union and the Soviet government to maintain peace throughout the world, to consolidate friendship between nations, and to prevent a thermonuclear catastrophe, corresponds to that principled position.

Notes to Chapter 9

[1] V. I. Lenin. The Tasks of the Youth Leagues. *Collected Works*, Vol. 31 (Progress Publishers, Moscow, 1982), p. 287.
[2] *Ibid.*, p. 286.
[3] *Ibid.*, p. 287.
[4] Frederick Engels. *Dialectics of Nature* (Progress Publishers, Moscow, 1976), p. 250.
[5] Marx, Engels. *The Holy Family, or Critique of Critical Criticism* (Progress Publishers, Moscow, 1975), p. 44.
[6] *Ibid.*, p. 43.
[7] V. I. Lenin. *Op. cit.*, p. 295.
[8] V. I. Lenin. Report of the Commission on the National and Colonial Questions to the Second Congress of the Communist International on 26 July, 1920. *Collected Works*, Vol. 31 (Progress Publishers, Moscow, 1982), p. 244.
[9] Karl Marx. *A Contribution to the Critique of Political Economy* (Progress Publishers, Moscow, 1977), p. 21.
[10] Frederick Engels. *Anti-Dühring* (Progress Publishers, Moscow, 1975), p. 137.

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